THE IRON TRADE REVIEW

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STRIKE AVERTED

PEACE WILL REIGN IN SHEET AND TIN PLATE INDUSTRIES.

Men made Large Concessions.—Large Contract for Steel Bars.—Activity in Making Specifications.

The first half of the year has been disappointing in some respects, and the second half opens with pig iron dull and weak, but there are sound reasons for believing that, while we shall not see boom conditions this year, the iron business will be very prosperous. One of the encouraging indications was the rush with which specifications on contracts for finished material came in during the last week of June and another was the settlement of the sheet and tin plate wage scales.

Consumers' Specifications.

As it was understood that contracts for the first six months would be cancelled July 1 unless specifications were received prior to that date, a great quantity of specifications was received, especially on steel bars, plates, structural steel, sheets and wire products. The man who was not anxious to insure the delivery of material for which he had contracted was indeed seldom found. Some of the deliveries can not be made for months.

Large Orders for Cast Iron Pipe.

Except in heavy material there has been little business in finished lines. The leading producer closed a contract for 10,000 tons of cast iron pipe. There is a heavy demand for track supplies. Traction lines at Toledo have placed orders for 5,000 tons of standard section steel rails. Several of the largest producers now have orders for all the rails they will be able to make this year.

Settlement of Wage Scales.

Although, as was predicted in these columns last week, the Amalgamated Association conceded all demands made by the American Sheet & Tin Plate Co., there was a hitch at the conference and the settlement of the sheet and tin plate wage scales this week after last week's fruitless efforts came as a surprise to the trade. It was known ten days ago that the union would make almost any concession asked to prevent a strike, but the basis on which the workers accepted a settlement was more liberal than was expected. Last year's scale will continue in force and the limit of output has been removed in both the sheet and tin plate mills. In addition extras for wide plates have been cut off entirely and the rebate for exports will be increased from 1½ to 3 percent. When it was seen that no agreement could be reached after a two day conference, an order was issued by the officials of the American Sheet & Tin Plate Co. to close all the union sheet and tin plate mills last Friday night, when the scale year came to a close. How many of these mills will resume immediately cannot be learned at this time, although it is probable that the fifty tin mills at New Castle will remain idle for some time for repairs. The scale of course will be accepted by the independent manufacturers and the strike which it was feared would come has been averted by the Amalgamated Association, whose officers knew that such a conflict would result in the disruption of their not too strong organization.

Big Contract for Steel Bars.

The Pittsburg Steel Co. has closed a contract with the Carnegie Steel Co. for its entire supply of steel for a period of five years. This, however, does not interfere with the 72,000 ton contract for Bessemer billets closed with the Republic Iron & Steel Co. some time ago for delivery during the next twelve months. The requirements of the Pittsburg Steel Co. are upwards of 200,000 tons of Bessemer and open hearth billets annually and while the terms of the sale were not given out, it has been learned that the basis is a favorable one, the selling price of Bessemer iron to govern the price of the steel on monthly adjustments.

Billets and Sheets Bars Decline.

Billets and sheet bars have declined further and steel producers are now naming the official price of $21 on Bessemer billets, while $23 is quoted on open-hearth. Bessemer and open-hearth sheet bars are quoted at $23.25 to $24, but the consumers are not interested at these prices. The mills, on the other hand, are anxious to close contracts for the last half of the year on this basis, but the present condition of the finished material market does not warrant the consumers covering for six months' requirements.

Calling for Pig Iron.

Users of pig iron are very active in calling for deliveries on contracts. For No. 2 foundry, furnaces quote $14.25 to $14.50. Bessemer and basic can be purchased at $14, although some of the makers refuse to quote as low as that, saying that they prefer to pile their iron. On Southern iron, $11.25 is now the usual quotation, and there is reason for believing that $11 has been done—a decline of $1.50 since June 1. There is an inquiry in the market for 11,500 tons of malleable from an Illinois concern for last half delivery. In nearly all iron centers, there is little interest in the market, but an exception is Chicago, where there were a number of transactions involving a considerable tonnage closed.

Almost Five Million Tons.

June made a new record for ore shipments on the Great Lakes, the total being only 550 tons short of 5,000,000, and nearly 400,000 tons in excess of the previous record, that of May of this year.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Marked Change in Conditions Since the First of the Year.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, July 5.

Iron and steel trade conditions at the beginning of the second half are the reverse of those existing the first of the year. At that time there was heavy buying of all finished lines and pig iron was advancing. There was also considerable buying of the heavier forms of material, but it was not generally believed that the tonnage of plates, shapes and rails would reach the present enormous total. Practically all forms of finished material and pig iron, on the other hand, instead of advancing in price, as was generally expected, have declined, and the second half of the year opens with a dull market for these commodities. The activity in the heavier lines, it is generally believed, is sufficiently great to instill confidence in the general situation and a revival of demand for finished products and pig iron is anticipated before the end of the summer.

Pig Iron.—The market continues exceedingly quiet. Consumers are urging deliveries on existing contracts indicating a heavy consumption and there is little doubt but that they will be compelled to buy for future requirements shortly. Southern iron is now offered openly in this market on the basis of $11.25, Birmingham, for No. 2, and there is little doubt that $11 could be done on a large tonnage. Valley furnaces are quoting $14.25 to $14.50 on No. 2 while Bessemer and basic can be had at $14. Next Monday three furnaces of the New Castle, Pa., plant of the Carnegie Steel Co., New Castle, Pa., which have been banked for several weeks will resume operation. These stacks have been idle on account of an accident at the steel plant which has also been down, but which will resume at the same time. We quote:

Bessemer, Valley	$14 00 to 14 25
Bessemer, Pittsburg	14 85 to 15 10
No. 1 Foundry	16 00 to 16 25
No. 2 Foundry	15 35 to 15 60
Gray Forge, Pittsburg	14 60 to 14 75
Basic, Valley	14 00 to 14 25
Basic, Pittsburg	14 85 to 15 10

Steel.—On Bessemer billets the leading steel mills are now quoting the official price of $21, but consumers are not anxious to close on this basis, despite the offers of the steel producers to cover their requirements for the next six months. Open-hearth billets still command a premium on account of the big demand for this grade of steel and are quoted at $23. Bessemer and open-hearth sheet bars are quoted at $23.25 to $24, while Bessemer and open-hearth rods are in little demand at $32 to $33.

Ferro-Manganese.—The market continues quiet, foreign ferro, 80 percent, being held at $49.50 to $50, delivered at buyer's mill.

Muck Bar.—Most of the iron mills throughout this district have been closed for the week and a few will remain idle throughout the month. We quote neutral bars for prompt delivery at $26.50, Youngstown, while for future delivery $26 can be done.

Skelp.—The market continues quiet. Steel grooved skelp is quoted at 1.45c to 1.50c and sheared at 1.55c. Grooved iron is held at 1.60c and sheared 1.65c.

Rails and Track Material.—Rail tonnage continues heavy and on Wednesday the rail mill at the Ohio works of the Carnegie Steel Co. resumes operations on rails. From present indications this mill will operate in full until November. The Edgar Thomson rail mill now has specifications on its books until December. The light rail market continues quiet and prices are still low.

Quotations are unchanged as follows: Fifty lb. and over 500 tons, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 lb., $25 to $25.50; 20 lb., $24 to $24.50; 25 to 45 lb., $22 to $22.50; angle bars for standard sections, 1.25c; spikes, 1.70c.

Plates.—Steel car works' requirements still lead, although the demand from miscellaneous industries is improving considerably. Deliveries on open-hearth cannot be made in less than four months, although 60 days can be made on most Bessemer sizes.

Quotations are unchanged as follows: Tank plates, ¼ in. thick, 6¼ in. to 14 in., inclusive, 1.50c f. o. b. mill Pittsburg; over 14 in. up to 100 in., 1.60c. Extras are as follows per 100 lb.: Flange and boiler steel, 10c; marine, A. B. M. A., and ordinary fire box, 20c; still bottom, 30c; locomotive firebox, 50c; plates over 100 in. up to 110 in. in width, not less than 5c extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, 10c extra; gauges 7 and 8, 15c extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific Coast.

Structural Material.—While little new business has been placed, all of the mills are filled with orders and are unable to make deliveries on certain sizes in less than four months

Quotations are unchanged as follows: Beams and channels up to 15 in., 1.60c; over 15 in., 1.70c; angles, 3 x 2 up to 6 x 6, 1.60c; zees, 1.50c; tees, 1.65c; angles, from 3 to 16 in., 1.60c; universal and sheared plates, 6¼ to 14 in., inclusive, 1.50c; over 14 in., 1.60c base.

Bars.—A few small contracts for steel bars covering requirements for the last half of the year have been closed by local mills on the basis of 1.50c, but the large consumers are not asking for prices and the indications are that they will not buy until later in the year. The demand for bar iron on the part of the railroads continues heavy and local mills report a good tonnage on their books. We quote:

Bar iron 1.60c Pittsburg; hoops 1.65c, and bands 1.50c, both taking hoops and band extras respectively. Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees, under 3 in., 1.65c. The following differentials are maintained on steel: Less than 200 lb. of a size and not less than 1,000 lb., 10 cents advance; less than 1,000 lb. of a size, 30 cents advance.

Sheets.—After practically all of the union sheet and tin plate mills closed at midnight Friday on account of the expiration of the scale year and the outlook for a prolonged strike was favorable on account of the failure of the wage committee of the Amalgamated Association and the officials of the American Sheet & Tin Plate Co. to reach an agreement, a settlement of the wage matter was effected on Monday. While a number of mills will remain idle for several weeks, there will be a pretty general resumption before August 1, and jobbers of both sheets and tin plate who were holding their stocks firmer in anticipation of a strike this week are again offering their material at the concessions existing before the wage scales came up for consideration.

We quote: No. 30, 2.70c; No. 29, 2.60c; No. 28, 2.30c; No. 27, 2.20c; Nos. 25-26, 2.20c; Nos. 23-24, 2.15c; No. 18-20, 2.10c;

No. 16, 2.10c; Nos. 12-14, 2.05c; No. 9, 2c; No. 8, 1.95c; Galvanized, No. 30, 4.30c; No. 29, 3.80c; No. 28, 3.40c; No. 27, 3.20c; Nos. 25-26, 3c; Nos. 23-24, 2.80c; Nos. 18-20, 2.65c; No. 16, 2.50c.

Wire and Wire Nails.—Most of the wire and nail mills in this district have been closed and the nail mills will not resume for a month. The wire mills, on the other hand, are scheduled to resume in about two weeks. Concessions of about $1 a ton continue to be reported, and current demand is light.

We quote: Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in ten days. Iron and steel cut nails, $1.70 to $1.75.

Pipe and Tubes.—Demand for merchant pipe continues seasonably light, although specifications on boiler tubing are heavy and are crowding the mills. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book:

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	67	51	65	49
¾ to 6 inches	75	65	73½	63½
⅜ and ½ inch	71	59	69	57
7 to 12 inches	70	55	68½	53
Extra Strong Plain Ends.				
⅛ to ¾ inch	60	48	58	46
½ to 4 inches	67	55	65	53
4½ to 8 inches	63	51	61	49
Double extra strong plain ends, ½ to 8 inches	56	45	54	43

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel.	Iron.
1 to 1½ inches	44	41
1 ¾ to 2½ inches	56	41
2½ inches	58	46
2¾ to 5 inches	64	53
6 to 13 inches	56	41

Less than carloads 2 points less.

Merchant Steel.—Demand for high grade steel is fair for this season, while the shafting manufacturers report their product in good demand.

We quote: Cold rolled and ground shafting, 50 percent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.0c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.70c to 1.75c; toe calk, 2c to 2.05c.

Old Material.—The market continues absolutely lifeless. Consumers will not buy until they see bottom on pig iron and trading is largely limited to the dealers. We quote, gross tons, as follows:

Heavy melting stock, $14 to $14.50; No. 1 wrought, $14.50 to $15; re-rolling rails, $14; bundled sheet scrap, $12 to $12.50; busheling scrap, $12 to $12.25; turnings, $9 to $9.25, and cast scrap, $13 to $13.25.

Coke.—Coke production continues to be curtailed, the H. C. Frick Coke Co. having drawn nearly 2,000 ovens within the past two weeks while W. J. Rainey has banked about 1,000 In the upper region there are 3,380 ovens idle while in the lower region the proportion of activity is greater, only 412 ovens having been put out. During the week ending June 24, the upper region produced 256,609 tons while the lower region produced 82,800 tons. Coke production of the Connellsville region during the first half of the year broke all previous records amounting to about 7,000,000 tons and the indications are that this year will be the biggest in point of output in the history of the region. There is practically no buying of furnace coke, and prices are somewhat easier, good Connellsville product being offered as low as $2 for the last six months. Foundry coke is held at $2.25 to $2.35.

CHICAGO.

Heavy Specifications on Finished Lines.—Demand for Pig Iron Improved.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, July 4.

Two causes contributed to a remarkably active market last week. The first of these was the expiration June 30 of a large number of contracts for various forms of finished material, and the second was the general closing down Saturday night of nearly all the mills in this district for midsummer repairs and stock taking. The reopening of a number of wire mills is indefinite, as it was the opinion of several manufacturers at the recent meeting of independent interests held in this city that they would remain shut down until market conditions improved. An extraordinary volume of specifications poured in every day last week for steel bars, structural steel, sheets, wire products, etc., consumers being eager to take advantage of the concession made by producers to deliver in the last half all material specified before June 30 on the contracts made in the early part of this year, as well as to assure themselves of a stock in hand during the idle period. Technically speaking, therefore, all the contracts made at the low prices of six months ago were cancelled on the date of their expiration, but this action of mills is tantamount to a time extension of same, as it will be months before all the deliveries can be completed. Except in heavy lines, new business was not of large volume last week. About 20,000 tons of standard sections were taken by Eastern mills, and 10,000 tons of cast iron pipe were closed up by the leading producer. The weakness of sheets may be estimated by the admission that one contract for a round lot made over six months ago at a price between $4 and $5 lower than prevailing quotations was extended through the last half. Boiler tubes are also ragged, independent makers offering concessions from published prices to stimulate demand. Billets are easier and local prices have been reduced $1 a ton.

Pig Iron.—More tonnage materalized in the past week on the inquiries pending than in any preceding week since the downward movement commenced. The transactions have included lots ranging from 500 tons to 3,000 tons, those concluded with Southern furnaces having been taken at prices ranging from $11.25 to $11.75 Birmingham for No. 2 foundry. The open market still rests at $11.50, however, the higher price having been made to carload buyers only. Several of the larger contracts were closed on the basis of $11.25, and on equal tonnage this price can doubtless be duplicated. But in cases where smaller lots were involved in which this price was named, it usually transpired the quotation was made on an analysis which allowed the furnace some leeway in the silicon contents. There is a strong inquiry for Northern foundry and malleable irons. Two local malleable plants, whose inquiries aggregate 6,000 tons, have bid $15.50 Chicago, as the price at which they will do business, but none of the local furnaces will consider anything less than $16 f. o. b. furnace yard. Foundry grades are unchanged at the quotations of a week ago. The local stacks do not appear anxious for business at the prices prevailing; and as most of them are comfortably filled for several weeks ahead, they are content to dole out their unsold tonnage in small lots until the market strengthens and values are higher. New wants are continually being figured on, the total tonnage pending running into five figures. Probably the largest individual inquiry is that from the American Car and Foundry Co. which is receiving bids on 2,000 to 3,000 tons of Southern irons and an equal amount of Bessemer. As soon as it is realized by Western melters that bottom has been

touched, there is anticipated the most pressing and active buying movement that has been felt in a couple of years. We have revised our prices, and quote as follows:

Lake Superior charcoal	$16 75 to 17 25
Northern Foundry No. 1	16 50 to 16 75
Northern Foundry No. 2	16 00 to 16 25
Northern Foundry No. 3	15 50 to 15 75
Northern Scotch Foundry	17 00 to 17 25
Ohio Strong Softeners No. 1	16 80
Ohio Strong Softeners No. 2	16 30
Southern Foundry No. 1	15 40 to 15 65
Southern Foundry No. 2	14 90 to 15 15
Southern Foundry No. 3	14 40 to 14 65
Southern Foundry No. 4	14 15 to 14 40
Southern No. 1 Soft	15 40 to 15 65
Southern No. 2 Soft	14 90 to 15 15
Southern Gray Forge	13 90 to 14 15
Southern Mottled	13 65 to 13 90
Southern Silveries (4% to 6% Silicon)	16 65 to 17 15
Jackson Co. Silveries (6% to 8% Silicon)	19 30 to 20 30
Jackson Co. Silveries (8% to 10% Silicon)	20 30 to 21 30
Alabama and Georgia Car Wheel	19 65
Malleable Bessemer	16 00 to 16 50
Basic Iron	15 40

Billets.—The week past has seen a softening in billets, especially in eastern markets, where the supply is more generous. Local prices are firm because of the limited output from mills in this district. Open hearth forging billets are quoted in Chicago at $30; Bessemer or open hearth rerolling, $26. Wire rods are still held at $33 Pittsburg, trading in same being at a minimum.

Bars.—Great interest is manifested by steel buyers in the possible action of mills on the question of prices for the last half. It is absolutely denied here that any contracts expiring June 30, made on the basis of 1.30c Pittsburg, have been extended. There were only a few on which such action could be taken, as against most of them specifications had been received in full, mills being literally snowed under with shipping orders in the week under review. There were some contracts made on the basis of 1.40c Pittsburg that were extended for three months by local interests, but these were exceptional cases and limited to firms whose tonnage is very desirable. No buying for the last half has yet been felt and none is expected until toward the middle of the month when the inventory season will be about over. Bar iron is without appreciable change. Demand is of a limited order, and prices range from 1.50c to 1.55c.

Other quotations are as follows: On carload lots, mill shipments, Chicago delivery: Bessemer and open-hearth bars and bands, 1.66½c base, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 1.81½c base, full extras. Store trade is active and prices are firm. We quote bar iron, 1.90c base, full extras; soft steel bars and bands, 1.85c to 1.95c base, full extras; soft steel angles, channels and tees, under 3 in., 1.95c to 2.05c; hoops, 2.20c base, full extras.

Sheets.—Sheets have moved freely in the past week, the shutting down of many mills during July for repairs and inventory having greatly stimulated the demand. The Inland Steel Co.'s plant at Indiana Harbor will remain closed until July 15th. Prices have not shown any disposition to strengthen in the face of the improved demand, independent makers eagerly seeking business at from $1 to $2 a ton below the quotations of the leading producer.

We continue to quote carload lots, mill shipments, Chicago delivery, as follows: Blue annealed sheets, Nos. 9 and 10, 1.81½c; Nos. 11 and 12, 1.86½c; Nos. 13 and 14, 1.91½c; Nos. 15 and 16, 2.01½c. On box annealed, one pass, cold rolled, we quote Nos. 18 and 20, 2.21½c; Nos. 22 and 24, 2.26½c; Nos. 25 and 26, 2.31½c; No. 27, 2.36½c; No. 28, 2.46½; No. 29, 2.56½c; No. 30, 2.66½c. We quote on lots from warehouse stocks as follows; No. 10, 2.10c to 2.15c; No. 12, 2.15c to 2.20c; No. 14, 2.20c to 2.25c; No. 16, 2.30c to 2.35c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.70c to 2.75c; No. 27, 2.75c to 2.85c; No. 28, 2.85c to 2.95c; No. 29, 3c to 3.05c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: Nos. 12 and 14, 2.46½c; No. 16, 2.61½c; Nos. 18 and 20, 2.76½c; Nos. 22 and 24, 2.91½c; No. 26, 3.11½c; No. 27, 3.31½c; No. 28, 3.51½c; No. 29, 3.76½c. Jobbers' prices on lots from store are as follows: Nos. 10 to 14 inclusive, 3.10c; No. 16, 3c; Nos. 18 and 20, 3.10c; Nos. 22 and 24, 3.25c; No. 26, 3.50c; No. 27, 3.70c; No. 28, 3.95c; No. 29, 4.40c; No. 30, 4.85c.

Structural Steel.—Considerable activity was noted last week among consumers whose contracts were not completed. Specifications were very heavy, and it will be some months before mills can catch up on their deliveries. The heavy consumption of structural steel in this market may be noted from the fact that in all the contracts made in the first half which expired June 30, the tonnage in each was fully specified and none had to be canceled. The only contract of importance let last week was that for one section of the new Boston store building, which will require about 4,000 tons of steel shapes. Light angles are extremely scarce, and premiums of $2 to $4 a ton were offered last week for quick shipment of same.

We quote, Chicago delivery, as follows: Beams and channels, 3 to 15 in., inclusive, 1.76½c; angles, 3 to 6 in., ¼ in. and heavier, 1.76½c; angles larger than 6 in., or one or both legs, 1.86½c; beams larger than 15 in., 1.86½c; zees, 3 in. and over, 1.76½c; tees, 3 in. and over, 1.86½c; with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. We quote prices from store as follows: 2.10c to 2.25c for angles, beams and channels, base sizes, with 2.20c to 2.30c for 18, 20 and 24-in. beams; tees and zees, 2.15c to 2.25c. These prices are for either random lengths or cut to specifications in excess of 5 ft.

Plates.—While independent producers are in good position to give fairly quick deliveries on new business, the leading maker in this section is overwhelmed with orders, and if not another ton was received the specifications already in hand would keep its plant running to full capacity until the end of October. All the local mills have shut down over the Fourth and some will remain idle until the middle of the month for the purpose of taking inventory and making repairs. Specifications and new business are of good volume, local jobbers getting a good slice of the latter because of their ability to ship from stocks when necessary. Prices are firm.

We quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ in. and heavier, 6⅛ in. to 100 in., 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base, all full extras. Plates, 3-16 in. thick, $2 extras; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Store quotations are as follows: Tank steel, ¼ in. and heavier, up to and including 72 in. wide, 2c; over 72 in. wide up to 100 in., 2.10c; over 100 in. wide, usual mill extras, 3-16 in. up to but not including 72 in. wide, 2.10c; 3-16 in., 72 in. wide, 2.35c; flange steel, 25c extra; heads, 25c extra.

Merchant Pipe.—Midsummer dullness and inventory taking has reduced the volume of specifications from jobbers and consumers. Business, however, is of good volume, and fully up to the expectations of sellers.

MERCHANT PIPE.

	Steel. Black. Percent.	Steel. Galv. Percent.	Iron. Black. Percent.	Iron. Galv. Percent.
⅛ to ¼ inches	65.85	49.85	63.85	47.85
⅜ to ½ inches	69.85	57.85	67.85	55.85
¾ to 6 inches	73.85	63.85	72.35	62.35
7 to 12 inches	68.85	53.85	67.35	51.85

PLUGGED AND REAMED.

	Steel.	Iron.
1 to 4 inches	71.35 / 61.35	69.85 / 59.85

EXTRA STRONG PIPE.

⅛ to ⅜ inches	58.85	46.85 / 56.85 / 44.85
½ to 4 inches	65.85	53.85 / 63.85 / 51.85
4½ to 8 inches	61.85	49.85 / 59.85 / 47.85

DOUBLE EXTRA STRONG PIPE.

⅛ to 8 inches	54.85	43.85 / 52.85 / 41.85

Rails and Track Supplies.—About 20,000 tons of heavy rails were placed with Eastern mills by Western interests in the week under review, 12,000 tons of which came from one railroad system. Light rails are quiet, owing to the inability of the local producer to make deliveries inside of

two months. Track supplies are in brisk demand, the entire output of Western mills going into immediate consumption.

We quote heavy sections, in 500-ton lots and over, f. o. b. mill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails are as follows: 12-lb. sections, $27; 16-lb., $26; 20 and 25-lb., $25; 30, 35, 40 and 45-lb. sections, $24, all f. o. b. Milwaukee mill. Track supplies, f. o. b. Joliet mill, angle bars, 1.40c to 1.50c; spikes, first quality, 1.75c to 1.80c; track bolts, 3¼ x ¾, with square nuts, 2.40c to 2.50c per lb., with hexagon nuts, 2.55c to 2.65c.

Boiler Tubes.—Some falling off is noted in the tonnage from the regular boiler trade, which is attributed to the holiday season. Specifications and orders from railroads and locomotive builders are very heavy.

BOILER TUBES.	Steel.	Iron.	Seamless.
1 to 1½ inches	40.35	37.35	53.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	Up to 4½ inches 50.50
6 to 13 inches	52.35	37.35	

Less than carload lots from store, as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

Merchant Steel.—There is an active demand in the form of specifications for all the specialties quoted below. The call for plow steel is especially heavy, producers asking from $3 to $5 over the prices of last half for quick deliveries of this product. Contracting for requirements from July to December has not yet commenced, consumers waiting to see what action will be taken by mills on the question of prices for the next six months. It is denied by local sellers that any low-priced contracts have been or will be extended, new wants will have to come in on the present basis.

Prices are without change and we quote carload lots, mill shipments, Chicago delivery as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c; smooth finish machinery steel, 1.91½c; smooth finished tire, 1.86c; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21½c. Cold rolled shafting, 50 percent off in carload lots and 45 percent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and upwards.

Cast Iron Pipe.—During the week past, contracts have been received by the leading producer for 6,000 tons of pipe for Kansas City; 1,250 tons for Belden, Mich., 850 tons for Manistique, Mich., and 400 tons for Mt. Olive, Ill., together with a miscellaneous tonnage from the general trade. Prices continue firm, and we quote carload lots, Chicago delivery, as follows: 4-in., $29; 6-in. to 10-in., $28.50; 12-in. and larger, $28; gas pipe $1 a ton higher.

Wire Products.—All the mills in this district were shut down Saturday night and will remain closed for several days. The date on which they will resume operations will be determined according to the necessity of repairs in each and the condition of the market. Up to the present time, the demand for nails and fencing has been very satisfactory, being unusually heavy for this time of the year. The meeting of independent manufacturers of wire products held in Chicago ten days ago was well attended. Nothing was done except to discuss trade conditions and reaffirm prices.

Prices are without change, and we quote on carload lots, as follows: Wire nails, $1.95; painted barb wire, $2.10; galvanized barb wire, $2.40; smooth annealed wire, $1.80; smooth galvanized wire, $2.10; polished staples, $2.05; galvanized staples, $2.35. Less than carload lots to jobbers are 5 cents higher than above prices. The retail trade is quoted 5 cents extra over the foregoing on carload lots, and 10 cents extra on less than carload lots. Bale ties are unchanged at 82½ and 5 percent to dealers on mixed car lots and 85 percent discount f. o. b. Waukegan, Ill., on straight carload lots.

Coke.—The tone of the local market is very strong. Only a small tonnage has been contracted by western furnaces or foundries for deliveries in the last half, and a good buying movement is expected as soon as the trade realizes the bottom has been reached. Furnace coke is offered at $2 Connellsville ovens, and 72-hour foundry coke at $2.50 Connellsville ovens. Virginia and West Virginia cokes range from $2.25 at the ovens and upwards.

Old Material.—The local market continues without any features of interest. Trading is at a low ebb, being limited to such small lots as melters require for filling in purposes. Prices are stronger in tone, though without material change. The only list of importance that was figured on last week was that of the C. & N. W., for about 500 tons. We quote gross tons, as follows:

Old steel rails (4 feet and over)	$13 00 to 13 25
Old steel rails (less than 4 feet)	12 50 to 13 00
Old iron rails	17 00 to 17 50
Relaying rails, subject to inspection	22 00 to 22 50
Old wheels	14 00 to 14 50
Heavy melting steel	12 50 to 13 00
Mixed country steel	10 00 to 10 50

The following quotations are for net tons:

No. 1 R. R. wrought	13 50 to 14 00
No. 2 R. R. wrought	12 50 to 13 00
Shafting	15 00 to 15 50
Dealers' forge, No. 1	10 50 to 11 00
Wrought pipe and flues	9 50 to 10 00
No. 1 cast, 150 lb. and less	12 00 to 12 50
No. 1 mill	8 50 to 9 00
No. 1 Busheling	9 75 to 10 25
No. 2 Busheling	8 50 to 9 00
Country sheet	7 00 to 7 50
No. 1 boilers, cut	9 00 to 9 50
Boiler punchings	12 50 to 13 00
Iron car axles	19 00 to 19 50
Steel car axles	14 50 to 15 00
Iron axle turnings	9 50 to 10 00
Cast borings	7 00 to 7 50
Mixed borings, etc.	7 00 to 7 50
Machine shop turnings	9 50 to 10 00
Railroad malleable	12 00 to 12 50
Agricultural malleable	11 00 to 11 50
Stove plate and light cast scrap	9 00 to 9 50
Old iron splice bars	15 50 to 16 00

CINCINNATI.

Southern Prices Hovering about $11.—Trade is More Quiet.

July 4.

Pig Iron.—The market shows continued dullness and there is no evidence that the long expected buying movement has started. A large part of the inquiry that has been in the market in the recent past has developed the fact that buyers were sounding the situation, and that the inquiry was more for that purpose than with a real intent to place orders. There is some increase in the small lot transactions to cover present needs, but as yet but few sales have been made to cover the second half requirements. A stove manufacturer bought about 600 tons at the close of last week, of which 300 tons was Southern and 300 tons Northern. The prices were said to be $11.25 Birmingham on the Southern, and $14 furnace on the Northern. In regard to prices, the developments of the week make it clear that $11 Birmingham can be done on some Southern brands and reports are current in the trade that that figure has already been done on several lots. It is said that a sale of 600 tons was made during the week on that basis. Another lot of 500 tons has been sold but no information as to the price was obtainable. The ruling quotation is now $11.25 Birmingham on Southern iron and $14.25 to $14.50 for No. 2 foundry at Southern Ohio furnaces. Some Jackson county 8 percent silvery has sold at $17 furnace. Gray forge is still dull and easy and can be bought at $9.75 Birmingham. There is an inquiry in the market for 11,500 tons of malleable Bessemer

from an Illinois concern for last half delivery. In a general way trade is more quiet than last week. No large orders are pending. Consumers are reported to be urging iron forward on their old contracts. The feeling in the trade is that the market is weak at quotations. Any business that offers is still eagerly sought after, and the lack of orders has evidently put the furnace interests in a mood to accept firm offers within reasonable limits. Quotations are revised to conform to the week's changes. We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$14 25 to 14 50
Southern Foundry No. 2	13 75 to 14 00
Southern Foundry No. 3	13 25 to 13 50
Southern Foundry No. 4	13 00 to 13 25
Southern Foundry No. 1, soft	14 25 to 14 50
Southern Foundry No. 2, soft	13 75 to 14 00
Gray Forge	12 50 to 13 00
Northern Foundry No. 1	15 90 to 16 15
Northern Foundry No. 2	15 40 to 15 65
Northern Foundry No. 3	14 90 to 15 15

Finished Material.—The market has shown no change during the week so far as prices are concerned and the jobbing demand for structural shapes continues active. Steel bars are in fairly good demand and prices are strong. Bar iron continues dull. Plates and sheets rule quiet and steady. Bar iron is quoted at 1.55c; steel bars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets at 75 and 7½ percent off. We quote black sheets, No. 27, at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 10, 2c. Tank plates are firm and sell out of store at 2c for ¼ in. and 2.16c for 3-16, No. 8 and No. 10. Beams and channels are quoted at 2c from stock and angles at 2c to 2.05c for base sizes.

In merchant pipe the demand is light and there is an easy undertone to the market, but no quotable change in prices. We quote f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ and ¼ inches	65.35	49.35	63.35	47.35
⅜ and ½ inches	69.35	57.35	67.35	55.35
¾ to 6 inches	73.35	63.35	75.85	61.85
7 to 12 inches	68.35	53.35	66.85	51.35

Old Material.—The demand is light and the market is easy at last week's reduced prices. Dealers report but few transactions. We quote f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$14 00 to 15 00
Cast machine and foundry, net tons	11 00 to 12 00
Old iron rails, gross tons	17 00 to 17 50
Old steel rails, gross tons	14 00 to 14 50
Old short lengths, gross tons	13 50 to 14 00
Old iron axles, net tons	20 00 to 21 00
Stove plate, net tons	7 00 to 7 50
Wrought turnings, net tons	9 00 to 10 00
Cast borings, net tons	6 00 to 6 50
Car wheels, net tons	13 00 to 13 50

Coke.—The demand is fair and the market is steadier for furnace coke, but there is no quotable change in prices. It is said that ovens are showing more indifference to orders at concessions under an anticipated scarcity of labor during the summer. Furnace coke is quoted at $1.75 to $1.85 and foundry coke $2.25 to $2.40 f. o. b. Connellsville. Virginia coke is reported firmly held at $1.85 for furnace coke f. o. b. ovens.

NEW YORK.

Few Transactions in Pig Iron.—Shapes and Rails are Active.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., July 4.

Although actual transactions in all grades of pig iron were extremely small during the past week, increased inquiries have strengthened producers in the belief that an early revival of business is on the way. The only orders booked outside the ordinary routine takings for immediate demands were for a 100-ton lot of Cherry Valley and another of 150 tons of gray forge, both at very satisfactory prices. Melters are still holding off for lower prices, being willing to provide only for their immediate needs. That consumption is fairly up to the normal is shown by the very active demand for foundry coke and the activity in the production of all cast iron work. Most of the local melters are content to pursue a hand to mouth policy, carrying only extremely small supplies of metal in stock and drawing freely upon future delivery orders placed some time ago. One consumer, known to require from twenty to thirty tons per day, is reported to have on hand only a two or three days' supply. Assurances from customers that they will be in the market for heavy tonnages during the middle of the month have, however, not entirely removed the feeling of discouragement caused by the report of sagging in other parts of the country. Quotations at tidewater are as follows:

Northern No. 1 Foundry	$16 50 to 16 75
No. 2 Foundry	15 50 to 15 75
No. 2 Plain	15 25 to 15 50
No. 1 Southern Foundry	15 75 to 16 25
No. 2 Foundry	15 00 to 15 50
No. 3 Foundry	14 75 to 15 00
No. 4 Foundry	14 50 to 14 75

Trading in pig iron certificates on the New York Produce Exchange have not been very active, and prices are in general somewhat lower, although those of the foundry classification have fairly held their own. Foundry pig iron warrants follow:

	Bid.	Asked.
July	14.75	15.10
August	14.75	15.10
October	14.75	15.10
February	15.00	15.25

Finished Iron and Steel.—Continued activity in structural shapes and standard rails characterized the trading in finished steel last week. Besides the large orders for rails reported last week, it is said that other even larger tonnages are soon to be placed. Although few important transactions in structural steel have been reported during the past few days, the volume of small orders for railroad bridges and highway bridges continues in excellent proportions, and several contracts of considerable size are now under negotiation. The demand for bar iron is only moderate, but full prices are obtained. Sheets, tin plate, pipe and wire continue slow and easy. We quote New York prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier, 1.74½c; beams, 3 to 15 in., 1.74½c; channels, 3 to 15 in., 1.74½c; beams, 18, 20 and 24 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.79½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary firebox, 1.94½c; refined iron bars, 1.60c; soft steel bars, 1.64½c to 1.67c; sheets in carload lots, New York, No. 28, black, 2.40c.

Old Materials.—Sales of 15,000 tons of heavy steel scrap to two of the large steel companies are reported. These transactions coming as they do after months of depression have had a stimulating effect upon all kinds of scrap materials, but thus far no noticeable change in prices is apparent. There is a better demand for low phosphorus steel scrap and also for cast scrap, and holders are not anxious to sell. Inquiry for steam and trolley car wheels resulted in sales of considerable size. Quotations approximately f. o. b. New York are as follows:

Old iron rails	$21 00 to 22 00
Old steel rails, long lengths	14 50 to 15 00
Old steel rails, short pieces	14 00 to 14 50
Relaying rails	20 00 to 21 00
Old car wheels	15 00 to 15 50
Old iron car axles	21 00 to 22 00
Old steel car axles	18 50 to 19 00
Heavy melting steel scrap	13 50 to 15 00
No. 1 railroad wrought scrap	16 00 to 16 50
Iron track scrap	13 50 to 14 00
Wrought pipe	11 00 to 12 00
Cast borings	8 00 to 8 50
Wrought turnings	12 25 to 12 75

PHILADELPHIA.

Some Conflict of Opinion as to Prospects.—Pig Iron is Weak.

July 4.

There is a curious and marked divergence of opinion among authorities as to the situation in the iron and steel market. Some large producers of pig iron express the confident opinion that bottom prices have been reached and that the rebound has already begun. In support of this view they state that not only has there been a decided increase in inquiries, but that a number of small orders have been placed. Some of these have been so urgent as to show that the consumers are absolutely bare of iron. The improvement has been very noticeable, these producers say, and they report a much more hopeful feeling. In opposition to this view other furnace men, in a position to be equally well informed, declare that they see no change for the better and that they expect lower prices before there is any marked reaction. Events of the next two or three weeks will doubtless show which view has best gauged the future.

Pig Iron.—Notwithstanding the optimistic views expressed in many quarters, the downward trend of prices seems to indicate that there is a considerable amount of unsold iron pressing on the market and weakening its position. This is especially the case with No. 2 X foundry, which at $16 per ton must be approaching the cost of production in many furnaces. Southern irons are also down to $15 for No. 2 X, dock delivery, and $15.50 for rail delivery. Rumor, as yet unconfirmed, has it that the Musconectong (N. J.) furnace, controlled by the Singer Manufacturing Co., is to be blown out soon. As the furnace is a small one and its product is almost entirely consumed by the owners, its closing would have no market significance. One of the Thomas Iron Co. furnaces, which was out of service for several weeks because of an accident, was blown in again last week. Prices may be quoted as follows:

No. 1X Foundry	$17 00 to 17 25
No. 2X Foundry	16 00 to 16 50
No. 2 Plain	15 50 to 16 00
Standard Gray Forge	14 50 to 14 75
Ordinary Gray Forge	14 25 to 14 50
Basic	16 00 to 16 25
Low Phosphorus	20 50 to 21 00
Southern No. 2X, rail	15 50 to 15 75
Southern No. 2X, dock	15 00 to 15 25

Finished Material.—There is no essential change to be reported. The mills engaged in turning out plates and structural material have all they can do for months ahead, and in the lighter lines, in which there has not been so much activity, there is a more cheerful feeling over the outlook. Prices remain unchanged: Beams, channels and angles, according to specifications, 1.73½c to 1.85c; refined iron bars, 1.63½c to 1.80c; steel bars, 1.63½c to 1.70c; plates, 1.73½c to 1.80c.

Old Material.—Conditions seem improved in the scrap market, and while there is no great activity, dealers are more disposed to hold out for their prices, instead of cutting them to make a sale. Several mills are reported to be almost bare of material and must start buying soon. Prices, which show little change from last week, may be quoted as follows:

Old steel rails	$14 75 to 15 50
No. 1 steel scrap	14 50 to 15 50
Old steel axles	17 00 to 18 00
Old iron axles	21 00 to 22 00
Old iron rails	17 50 to 18 50
Old car wheels	14 00 to 15 00
Choice scrap, R. R. No. 1 wrought	16 50 to 17 50
No. 1 yard scrap	15 00 to 15 50
Machinery scrap	14 50 to 15 00
Low phosphorus scrap	19 00 to 20 00
Wrought iron pipe	12 00 to 12 50
No. 1 forge fire scrap	12 50 to 13 00
No. 2 forge fire scrap, ordinary	10 00 to 11 00
Wrought turnings	10 50 to 11 00
Axle turnings, heavy	12 00 to 12 50
Cast borings	8 00 to 8 50
Stove plates	9 50 to 10 00

CLEVELAND.

June Makes a New Record in Ore Shipments.—Heavy Specifications Received.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, July 5.

Iron Ore.—The shipments for June make a new record, being only 550 tons short of 5,000,000 tons and 380,019 tons more than the previous high record, made in May of this year. The shipments by ports for June and for the seasons of 1904 and 1905 to July 1 were as follows:

	JUNE 1904	JULY 1 1904	JUNE 1905	JULY 1 1905
Escanaba	315,056	315,056	781,280	1,737,372
Gladstone	480	480	.....	.....
Marquette	132,280	132,280	419,955	1,017,933
Ashland	201,961	201,961	549,493	1,122,251
Superior	352,931	352,931	730,435	1,634,403
Duluth	360,018	360,018	1,379,491	2,747,018
Two Harbors	345,851	345,851	1,138,796	2,173,724
	1,708,577	1,708,577	4,999,450	10,432,701
1905 Increase			3,290,873	8,724,124

Pig Iron.—There is almost no new business being transacted, but foundries are urging deliveries on old contracts and sellers will be much disappointed if there is not considerable buying within a couple of weeks. In the meantime, prices show little change, except in the South, where they are weaker, $11.25 now being the usual quotation on No. 2 foundry, Birmingham, while it is believed $11 has been done. For Northern irons, $14.50 for No. 2 foundry, Valley, and $14. for basic and Bessemer, are the ruling prices, although some furnacemen are piling their iron rather than sell at such low prices. We quote as follows, f. o. b., Cleveland:

Besemer	$14 85 to 15 00
No. 1 Foundry	16 00 to 16 25
No. 2 Foundry	15 25 to 15 85
No. 3 Foundry	15 00 to 15 25
No. 2 Southern	15 10 to 15 35
Gray Forge	14 50 to 14 60
Gray Forge, Southern	13 50 to 13 75
Lake Superior charcoal	16 50 to 17 00

Finished Material.—Specifications on steel bars and other finished lines piled up so rapidly during the last days of June that some offices were compelled to work nights to take care of them. Nearly all buyers were extremely anxious to get in their specifications before the time of the expiration of their contracts for the first half of the year. Rail business continues active and we note the sale of another 5,000 tons for Toledo traction lines. We also note the sale of 2,000 tons of shapes and 1,000 tons of hoops and bands by the principal producer. The Ohio plant of the Carnegie Steel Co., Youngstown, began rolling rails today and the new rail mill of the Republic Iron & Steel Co. at Youngstown will be placed in operation July 10. Bar iron is in fair demand with prices ranging from 1.45c to 1.55c at the mills.

Old Material.—The market has been practically lifeless and conditions are apparently resting on the bottom. We quote gross tons, Cleveland delivery, as follows:

Old iron rails	$18 00 to 19 00
Old steel rails (over 6 feet)	13 50 to 13 50
Old steel rails (under 6 feet)	13 50 to 13 50
Old car wheels	14 00 to 14 50
Steel boiler plate	9 50 to 10 50
Steel axles	15 50 to 16 50
Malleable iron (railroad)	13 00 to 14 00
Malleable iron (agricultural)	12 00 to 13 00
Heavy steel	13 50 to 13 50

We quote as follows, net tons:

No. 1 R. R. wrought	$13 00 to 14 00
No. 1 busheling	11 50 to 12 50
No. 1 machine cast	12 00 to 12 50
Iron axles	19 00 to 20 00
Axle turnings	9 50 to 10 50
Wrought turnings (free from cast)	8 50 to 9 50
Grate bars	7 50 to 8 50
Pipes and flues	9 50 to 10 50
Tank iron	8 50 to 9 50
Hoop and band iron	7 00 to 8 00
Sheet iron	6 00 to 7 00
Wrought drillings	8 50 to 9 50
Stove plate	8 50 to 9 00
Cast borings	6 00 to 7 00

DECIDED TO MERGE

With National Association — Meeting of Cincinnati Metal Trades Association.

The quarterly meeting and dinner of the Cincinnati Metal Trades Association was held at the Zoological Garden Club House on Thursday evening, June 29. At the close of the dinner feature, the meeting was called to order by Mr. Philip Fosdick, chairman of the Entertainment Committee. Mr. Fosdick introduced Mr. Wm. Lodge, the retiring president of the association, who made a short and appropriate address introducing Mr. P. G. March, the newly elected president. Mr. March conducted the business features of the meeting, the most important of which was the question of merging the Cincinnati Metal Trades Association into the National Association. The sentiment of the membership had been ascertained by presenting the matter to each one individually and practically the consent of all members had been obtained previous to the meeting. It remained, therefore, to simply put the motion before the association for formal action, which was done and the motion carried unanimously. Under the motion, the executive committee was empowered to arrange the final details.

The next question considered was applications for membership and the following concerns were proposed and unanimously elected: the Von Wyck Machine Tool Co.; Conway & Co. and the American Valve & Meter Co.

President March requested that Mr. Fosdick preside as toastmaster, as the strictly business features of the meeting had been disposed of. Mr. Fosdick gracefully accepted and presided in his usual entertaining manner. Among those who spoke was Mr. P. E. Montanus, of Springfield, O., who is also secretary of the National Machine Tool Builders' Association. Mr. Montanus congratulated the Cincinnati Machine Tool Builders on the good-fellowship so evident among the members of the association. He said he believed a period of prosperity was ahead of the machine tool builders, but thought it was important that manufacturers should be ever alert in safeguarding their interests and not be unmindful of matters which were a menace to continued prosperity. In this connection, he called attention to the necessity for tariff revisions and reciprocity treaties in order that American manufacturers might expand their growing foreign trade and urged that all possible pressure be brought to bear upon the government at Washington to impress upon the government the necessity for action in this direction.

Mr. N. Paul Fenner Jr., of the American Valve & Meter Co., responded, briefly but forcibly calling attention to the necessity for a modification of the Chinese Exclusion Act, and stating that it was a matter of importance to machine tool builders as well as to all branches of American trade that a satisfactory treaty be made which would leave no obstacle in the way of our developing a market for our manufactures in China.

There were a number of other short addresses, but the occasion assumed the character of social good-fellowship and was most enjoyable to the close.

Interviews with the machine tool men who attended the dinner regarding the condition of the trade generally, resulted in the almost universal comment that business was quite satisfactory. Some of the shops are unusually busy and considering the season of the year orders are good.

Those in Attendance.

P. G. March, Cincinnati, Shaper Co.
N. B. Chace, Cincinnati Shaper Co.
Philip Fosdick, Fosdick Machine Tool Co.
Wm. Herman, Fosdick Machine Tool Co.
Robert Hosea, Jr., Wm. L. Payne.
W. T. S. Johnson, Bradford Machine Tool Co.
Geo. F. Stewart, Bradford Machine Tool Co.
Chas. P. Fox, Ahrens Fire Engine Co.
G. F. Ahrens, Ahrens Fire Engine Co.
Henry Ritter, Lunkenheimer Co.
Chas. G. Ritter, Lunkenheimer Co.
J. J. Aull, Lunkenheimer Co.
Sam. L. Moyer, Lunkenheimer Co.
Wm. H. Muench, Lunkenheimer Co.
Oscar W. Mueller, Mueller Machine Tool Co.
Frank Johannigmann, J. M. Robinson Mfg. Co.
C. L. Frey, J. M. Robinson Mfg. Co.
Chas. F. Waltz, Secy. Employers' Assn.
Jos. D. Morten, *The Iron Trade Review.*
A. C. Fischer.
E. N. Atkins, Warner Elevator Mfg. Co.
G. E. Goff, Warner Elevator Mfg. Co.
Elmer R. Dieterle, Henry Disston & Sons Co.
L. L. Mather, Henry Disston & Sons Co.
E. M. Chace, Cincinnati Milling Machine Co.
C. R. Gabriel, Cincinnati Milling Machine Co.
Chas. S. Gingrich, Cincinnati Milling Machine Co.
Fred. A. Geier, Cincinnati Milling Machine Co.
C. Wood Walter, Cincinnati Milling Machine Co.
P. E. Montanus, Secy. National Machine Tool Builders' Assn.
Wm. Lodge, Lodge & Shipley Machine Tool Co.
L. B. Weber, Lodge & Shipley Machine Tool Co.
Leo F. Rechtin, Louis E. Rechtin Bros.
Louis E. Rechtin, Cordesman Machine Co.
Isidor Rauh, Cincinnati Electrical Tool Co.
E. M. Hargrave, Cincinnati Tool Co.
A. H. Tuechter, Cincinnati Machine Tool Co.
S. C. Schauer, Cincinnati Machine Tool Co.
N. Paul Fenner Jr., American Valve & Meter Co.
Geo. Langen, Cincinnati Planer Co.
B. B. Quillen, Cincinnati Planer Co.
W. H. Robertson, W. P. Davis Mch. Co., Rochester, N. Y.
F. E. LeBlond, R. K. LeBlond Machine Tool Co.
R. K. LeBlond, R. K. LeBlond Machine Tool Co.
J. A. LeBlond, R. K. LeBlond Machine Tool Co.
J. C. Hobart, Triumph Electric Co.
W. A. Greaves, Greaves-Klusman Co.
Henry J. Weber, Weber Foundry Co.
Kessler Smith, Machinists' Agent.
Si. Egan, J. A. Fay & Egan Co.
John A. Stewart, J. A. Stewart Electric Co.
Robert Dunning, Cincinnati Car Co.
Wm. Binder, Cincinnati Car Co.
M. R. Conway, Conway & Co.
J. T. Crutchfield, National Freight Agency.
E. Von Wyck, Von Wyck Machine Tool Co.
J. H. Day, J. H. Day Co.
J. B. Rose, American LaFrance Fire Engine Co.
Robert McEvilley, First National Bank.
Geo. Otting, Jno. Steptoe Shaper Co.
O. H. Broxtermann, Jno. Steptoe Shaper Co.
Benj. Sebastian, Sebastian Lathe Co.
Jacob May, Sebastian Lathe Co.
T. L. Greenwald, I. & E. Greenwald Co.
E. E. Greenwald, I. & E. Greenwald Co.
J. M. Manley, Secy. Cincinnati Metal Trades Assn.

INDEPENDENTS WILL SIGN.

(Special Telegram.)

PITTSBURG, July 5.—This morning the Amalgamated Association of Iron, Steel and Tin Workers sent out copies of the sheet and tin plate scales to the independent manufacturers and before the end of the week it is believed most of the mills will have signed. The independent mills now operating have taken advantage of the continuous provision of the scale, and, until they sign the present scale, will continue to pay last year's wages. The following concerns, operating sheet and tin plate and iron mills, have already signed the scale: Pittsburg Forge & Iron Co., Pittsburg; A. M. Byers & Co., Pittsburg; Brown & Co., Pittsburg; Cleveland Hardware Co., Cleveland; Lockhart Iron & Steel Co., Pittsburg; Colonial Steel Co., Pittsburg; Empire Rolling Mill Co., Cleveland; Helmbacher Forge & Rolling Mill Co., Madison, Ill.; Fort Wayne Iron & Steel Co., Fort Wayne, Ind., Highland Iron & Steel Co., Terre Haute, Ind.; Lake Erie Iron Co., Cleveland; Ohio Falls Iron Works, New Albany, Ind.; Sligo Iron & Steel Co., Connellsville, Pa.; Westerman & Co., Lockport, N. Y.; the American Rolling Mill Co., Muncie, Ind.; Interstate Iron & Steel Co., East Chicago, Ill.; Ewald Iron Co., Louisville, Ky.; the Western Steel Car & Foundry Co., Chicago; the Kansas City Nut & Bolt Co., Kansas City; American Sheet & Tin Plate Co., Pittsburg; Republic Iron & Steel Co., Chicago.

The Alabama Steel & Wire Co. has signed a contract with the union coal miners for its Altoona and Virginia mines. The Alabama Consolidated Coal & Iron Co. and the Alabama Steel & Wire Co. are the only furnace companies in the state signing the contract with the union miners. There is positively no indication of other companies making peace with the union miners. All commercial coal operators, who have signed with the union miners, have eased up in the work at their mines for this week on account of the Fourth of July holiday and for the purpose of giving the miners a little rest.

SHEET AND TIN PLATE WAGE SCALES ADJUSTED.

WHEN HOPE WAS ALMOST ABANDONED A SETTLEMENT WAS REACHED.

The Amalgamated Association Concedes Everything Demanded by the American Sheet and Tin Plate Co.

On Monday evening, July 3, the Amalgamated Association of Iron, Steel & Tin Workers and the American Sheet & Tin Plate Co. reached an agreement on the sheet and tin plate wage scales for the year beginning July 1, and the strike that was threatened in this branch of the industry has been averted.

The first conference was held with the American Sheet & Tin Plate Co. last week, beginning on Wednesday and it was adjourned on Friday without a date for reconvening. The wage committee of the Association could not at that time agree to the demands of the company and orders were issued on Friday to close all the union sheet and tin plate mills of the company for an indefinite period. A committee of four was then appointed by the association to have full power to effect a settlement if at all possible and a conference was arranged with the American Sheet & Tin Plate Co. on Monday and a settlement was made.

As pointed out last week, the workers would avoid a conflict if at all possible and the concessions they made to bring about a settlement of the scale were surprising to many manufacturers. The removal of the limit of output in both the sheet and tin plate mills is the biggest concession yet made by the Association. Last year this provision of the scale was violated in practically all of the union mills of the organization and this was the cause of precipitating many strikes in both sheet and tin plate mills. All of the non-union mills, both of the American Sheet & Tin Plate Co. and those operated by the independent manufacturers, had no limit of output and the union mills found that they were unable to compete against mills operating on such a favorable basis. Many of the workers rather than have the mills close agreed to work without a limit and matters soon reached such a stage that it was impossible for the officials of the association to cope with the situation and no effort was made to enforce this provision of the scale.

The limit of a turn's work of 8 hours which was removed for tin workers follows:

On Gauge.	100 lbs.
No. 8 to 11	14,000
" 12 to 13	13,000
" 14 to 15	12,000
" 16 to 17	11,000
" 18 to 20	10,000
" 21 to 24	8,000
" 25	7,250
" 26	6,850
" 27	6,650
" 28	6,650
" 29	6,350
" 30	6,250
" 31	6,050
" 32	5,650
" 33	5,450
" 34	5,250
" 35	5,250
" 36 and lighter	4,950

The number of heats on sheet mills was limited to ten to an eight hour turn. This is also removed and it is expected that the output of the mills can be increased fully 25 percent by this concession of the workers.

There is little doubt but that the independent sheet and tin plate manufacturers will agree to the terms of the settlement and most of the mills now idle will resume before the end of July. The scale for both the sheet and tin plate workers despite the demands for 18 and 22 percent advances respectively remains the same as in the 1904-05 scale. All the changes made in the foot notes pertain to the removal of the limit of the output. The fifth clause of the memorandum of agreement was changed to read as follows: "Rolling shall not start earlier than 5 a. m. Monday, and the week's work shall finish after the first eight hour shift on Saturday, except in mills that have no traveling cranes." The scale for spreading slabs has been left for local settlement at the request of the workers. Furthermore scale prices shall be paid for sheets lighter than 23 gauge and 32 inches wide. An advance was heretofore paid for these sizes. The company shall pay all tonnage and day hands and the rebate allowed for tinplate made for export shipment was continued on the present basis of 1½ percent on the tin plate workers until August 1, when it will be increased to 3 percent.

The scale of the tin house workers for the ensuing year was adjusted this week between the scale committee of the workers and the American Sheet & Tin Plate Co. The 1904-05 scale will continue in force for another year, although the workers attempted to enforce demands for an advance of about 15 percent. Now that the scale with the American Sheet & Tin Plate Co. has been signed the independent tin plate manufacturers will also sign.

ATTEMPTED TO BLOW UP PLANT.

Striking machinists attempted to blow up the plant of the Hanna Engineering Works, 820 Elston Avenue, Chicago, Saturday night, with dynamite. The attempt failed only because of the ignorance of the miscreants in the use of explosives. As it was the entire northwest corner of the main building was demolished; a large hole torn in the stone foundation and every pane of glass in the upper part of the building shattered. The loss was at least $2,500. The perpetrators of the deed have not yet been discovered, though many arrests have been made. The strike at this plant started June 7 and grew out of a demand by the employees for a closed shop.

MIDLAND STEEL COMPANY

Will Build Blast Furnace and Several Hundred Coke Ovens.

The Midland Steel Co., Pittsburg, has been organized for the purpose of erecting and operating a blast furnace plant at Cooks Ferry, Beaver county, on the Ohio river. A site of 1,000 acres has been purchased and a modern blast furnace will be built. The company also owns 1,000 acres of coking coal property on the Monongahela river and the coal from these mines will be transported by boat via the Monongahela and Ohio rivers to the furnace plant, where it will be coked. A battery of several hundred coke ovens will be built and the operations will be similar to those carried on by the Jones & Laughlin Steel Co. The incorporators of the company are: H. C. Fownes, president of the Carrie Furnace Co., the plant having been sold to the Carnegie Steel Co. some years ago, but the firm name and organization were retained; W. C. Fownes, W. C. Fownes Jr.; Charles McKnight, president of the National Bank of Western Pennsylvania; Joseph McK. Speer and J. Ramsey Speer. George K. Hampfeldt, who recently resigned as superintendent of the Carrie furnace plant of the Carnegie Steel Co., has been appointed general manager of the company. He will have charge of the engineering, erection and operation of the furnace.

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Americans interested in the iron and steel business visiting in Europe will find The Iron Trade Review on sale at the office of the International News Co., Breams Buildings, Chancery Lane, London, E. C., England. Copies will be forwarded on request, from London to any address in the world.

DISLOYAL AND UNPATRIOTIC.

Secretary Taft, in demanding the immediate retirement of Chief Engineer Wallace, of the Isthmian Canal Commission, took action which meets the approval of all business interests of the country, including employes who have a clear understanding of what loyalty to an employer means and are conscientious in the discharge of their duties. No one will deny that an employe has the right to accept new employment if he can do so without violating any obligation to his employer. If he has received fair treatment, he is bound to do as he has been done by.

In the case of Mr. Wallace, it is conceded that he had no cause for complaint, and after making due allowance for his explanations, it is still evident that Secretary Taft spoke truthfully when he said to Mr. Wallace:

> For mere lucre you change your position over night without thought of the embarrassing position in which you place your Government by this action, when the engineering forces on the isthmus are left without a real head and your department is not perfected in organization; when the advisory board of engineers is to assemble under call of the president within two months and when I am departing for the Philippines on public duty. All this you know as well as I know it, but it has not had the least influence upon your action—you have thought of yourself and yourself alone. I consider that by every principle of honor and duty you were bound to treat the subject differently. You have permitted the president and all of us to proceed in full confidence that you would perform the functions of chief engineer and now, in an hour you drop your great duties and throw them back upon us as if it were a mat'er of no consequence and all this for your personal advantage solely.

The ablest man at the head of any business or department of a business is he who so organizes it that, in case he resigns or dies, it will go on under the management of his subordinates without decrease in effectiveness. There may be something in a man's personality which he cannot impart to his subordinates, but the really able executive organizes as perfectly as he can and does not delight, as a supremely selfish man does, in building up an organization whose success depends almost entirely upon one person. The great man builds upon a solid foundation a structure of enduring strength. It is doubtful whether an engineer as selfish as Mr. Wallace seems to be would ever have constructed a successful organization. At any rate, he did not do it, but deserted his post without giving fair notice to the government. He was disloyal and unpatriotic.

FOR ONE MILLION TONS

Is the Contract of the Pittsburg Steel Co. with the Carnegie Steel Co.

The Pittsburg Steel Co., Pittsburg, Pa., closed a contract with the Carnegie Steel Co., Pittsburg, last week for its entire supply of open-hearth and Bessemer billets for a term of five years. The Pittsburg Steel Co. operates wire, rod and nail mills at Monessen, Pa., and a few months ago purchased about 190,000 tons of steel from the Carnegie Steel Co. and the Republic Iron & Steel Co. for delivery during a period of eleven months from Aug. 1 this year. The contract with the Republic Iron & Steel Co. provides for the delivery of 72,000 tons of Bessemer billets. As soon as this contract is filled, the Bessemer billets will be furnished by the Carnegie Steel Co. The contract closed with the Carnegie Steel Co. calls for the delivery of 1,000,000 tons and is one of the largest ever closed. No statement has been made with reference to the price, but it is understood that there will be monthly adjustments on a sliding scale basis and that the basis is a favorable one and will give this company steel considerably below the regular market price. Ever since the Pittsburg Steel Co. was organized its annual steel contract has been a bone of contention among the large steel producers. The Republic Iron & Steel Co. will not be materially affected by this long term contract inasmuch as its new rail mill will be of sufficient capacity to consume all the surplus steel now offered in the open market. This deal means much to the United States Steel Corporation, as it postpones indefinitely the erection of blast furnaces and a steel plant by the Pittsburg Steel Co.

Mr. Baird has Not Resigned.

The report that George A. Baird, general sales agent of the Republic Iron & Steel Co., had resigned is not true. Mr. Baird has gone to California on business connected with the estate of Peter L. Kimberley, of which he is one of the executors, but the Republic company is not willing to have him sever his connection with it.

New Steamship Company.

(Special Telegram.)

PITTSBURG, July 5.—The Shenago Steamship Co. was organized at Cleveland Monday to operate a fleet of ore carriers on the great lakes. A contract has already been placed with the Great Lakes Engineering Works for a 10,000-ton carrier. The incorporators of the company are: W. P. Snyder, Pittsburg, president; H. H. Brown, Cleveland, vice president; C. D. Dyer, and Henry Irwin Jr., of Pittsburg, secretary and treasurer, respectively.

AMERICAN SOCIETY FOR TESTING MATERIALS.

EIGHTH ANNUAL MEETING.

The eighth annual meeting of the American Society for Testing Materials, held at the Chalfonte Hotel, Atlantic City, N. J., was the most successful in the history of the association. Not only were the number of members in attendance larger and the papers read and discussed more numerous than ever before, but much was accomplished in the way of establishing uniform standards for the guidance of manufacturers and consumers of commercial products. Little time was consumed in reading voluminous reports and transacting routine business, and the sessions were full of interest from start to finish. Nearly all the official business of the society is submitted to the members by letter-ballot and it was possible to devote practically the entire time to discussion of direct personal interest. The committees on methods of testing mostly reported substantial progress, and those intrusted with the delicate task of recommending standards submitted results of the year's deliberations which promise to remove many of the differences and annoyances which accompany commercial transactions in manufactured products. The proposed revision of the standard specifications for iron and steel brought to light some differences of opinion among representatives of producers and consumers, but the matter was satisfactorily adjusted, with the assurance that the society will soon publish standards to which both parties can refer with confidence.

EDGAR MARBURG, SECRETARY OF THE AMERICAN SOCIETY FOR TESTING MATERIALS.

First Session, Thursday Afternoon.

The opening session was devoted largely to the consideration of the executive committee's report and the advisability or inadvisability of changing the status of the society as regards the International Association for Testing Materials.

The report of the executive committee showed that the progress of the society during the past year had grown from 485 to 677, and that the pages of the published proceedings had risen from 490 to 655. The number of standing technical committees had been increased from 11 to 18. The society promised soon to become self-sustaining. The relations with the International Association had been confined, as usual, to routine correspondence. The committee questioned whether in future individual members should not be left entirely free regarding membership in the International Association. A change in the by-laws, making membership in the International body optional was submitted. Dr. Moldenke inquired whether in case this change were made many members would retain their international membership, and whether the reduction of dues would not create a bitter feeling abroad. Secretary Marbury suggested that it was only a matter of equity and that it would merely place the American society upon the same footing as that of Germany. Prof. Merriman saw no objection to the change, and Mr. Major suggested that it might be well to be lenient with our European friends until uniform specifications could be secured. Mr. McLeod thought it unwise to do anything likely to endanger the coming of uniform standards, especially since America expected to have the markets of the world. A test vote showed that about one-third of those present would retain their international membership, and after further discussion it was decided to leave the matter to the decision of the association by letter ballot, with the recommendation to retain membership as an affiliated body with the payment of fees not less than $100 in addition to the sum contributed by members of both societies.

The report of the committee on Standard Methods of Testing was presented by Chairman Gaetano Lanza. The committee had progressed only so far as outlining the work to be done. The methods employed in different countries were to be investigated, sub-committees collecting material from all possible sources, and then the purpose was to find in how far they could be made uniform. Nine sub-committees were proposed.

Mr. Paul Kreuzpointner submitted the report of the committee on uniform speed in commercial testing. The committee had invited other members to aid in its work and discussed at some length the different properties of the test price involved in commercial testing. Viscosity and hardness were the two factors to be considered in the resistance of a metal. The influence of heat developed at high speed was also considered. The committee assumed that a speed of six inches for testing steel of .45 carbon and less was compatible with reliable results. Five members agreed with the findings of the committee, while a minority of two did not, believing that more tests should be made before arriving at a conclusion. A discussion of the yield point followed, Prof. Wm. Kent, among others, being of the opinion that it should be recorded.

The committee on fire-proofing materials reported through its chairman, Prof. Ira O. Woolson, that it had as yet had merely laid out its work for the future.

Herman Von Schrenk, chairman of the committee on standard specifications for the grading of structural timber, reported that so far only an informal discussion of the problems involved had taken place. He presented an outline for future action covering the subjects: "The Definition of Structural Timbers," "A Standardization of Trade Names," and "Grading," including standardization of defects, determination of sizes, and the uses to which the timber is to be put.

The election of officers to fill two vacancies in the executive committee resulted in the unanimous choice of W. A. Bostwick and John McLeod.

Thursday Evening, Joint Session.

The annual address of President C. B. Dudley was the event of the evening session, when the Society for Testing Materials met the Society for the Promotion of Engineering Education. Dr. Dudley chose as subject, "The Testing Engineer," a theme likely to interest every member of both societies. After considering the various kinds of engineering work and especially that of the testing engineer and the value of human antagonism in developing the truth, he dwelt upon the qualities necessary to make a successful career in this field.

Prof. W. K. Hatt described "A Course of Laboratory In-

struction in Testing Materials," as designed for the students of Purdue University. The course is so planned that the student gains a knowledge of the properties of materials by handling them and observing them under stress. Thus he becomes acquainted with the methods of carrying out the test; he is trained to observe accurately; after this preparatory course he becomes acquainted with properties as described in text-books, and finally given experience by carrying out actual tests and recording the results in a thesis. A somewhat similar course formed the subject of a paper by G. L. Christiansen, "A Course in Properties of Materials." He described especially the manner of conducting laboratory instruction, the manner of dividing large classes of students into sections and work required of each student.

Prof. Hibbard, of Cornell University, suggested that many of the defects of modern engineers' education were due to the large number of students in the classes. He believed in teaching principles and not the details of a vast number of experiments. The student should not get the material in a peptonized state. Prof. Goss believed that there was little danger of

ROBT. W. LESLEY, VICE PRESIDENT AMERICAN SOCIETY FOR TESTING MATERIALS.

falling into stale routine ways in the testing laboratory. The phenomena there observed were essentially interesting and stimulating. Mr. Metcalf emphasized the importance of teaching men to think and told of an amusing experience with an expert who spent three months in preparing an answer which did not reply to a simple question. Prof. W. Kent thought the saying "Teach principles and not details," had been overworked. He believed in teaching principles, and not too many details, but enough to explain the principles.

Dr. J. A. Holmes discussed the plans and scope of the proposed investigation of structural materials under the auspices of the U. S. Geological Survey. He said the purpose of the Government in undertaking this work was to bring this department into touch with the requirements of practical engineers. A recent investigation had dealt with coal, boilers and engines, and gas producer power plants. Other questions were to be attacked in a similar way. In order to bring the work as near practical requirements as possible, the department had sought the aid of experts in the practical field and had received help from members of the society. Richard L. Humphrey explained that the work of the U. S. Geological Survey was intended merely to supplement work already being done by private investigators. Workers in the industrial field rarely had time or opportunity to make exhaustive experiments because their efforts were directed towards a specific end only. W. L. Hall spoke of the investigations of the bureau of forestry which is co-operating with the Geological Survey in applying scientific tests to timber.

Friday Morning.

Two simultaneous sessions were held Friday morning, one of the section on cement and the other of the section devoted to the consideration of preservative coatings. In the absence of the chairman, S. S. Voorhees, the report of committee E, On Preservative Coatings for Iron and Steel, was presented by G. W. Thompson. The committee announced that it had its work well under way. At a meeting held in Philadelphia last December the following sub-committees had been appointed: On Standard Methods of Conducting Field Tests, W. A. Polk, chairman; on Standard Methods for Service Tests, G. W. Thompson, chairman; on the Permeability of Paint Films, C. B. Dudley, chairman; on the Permanency of Paint Films, Malcolm McNaughton, chairman; and on the Preparation of Iron and Steel Surfaces for Painting, J. W. Whitehead Jr., chairman. Each of these sub-committees presented a report.

G. W. Thompson in a paper on "The Proper Method of Conducting Paint Tests," said that practically nothing had been done since Dr. Dudley had prepared a series of papers on the subject a number of years ago. Before giving an outline for carrying out the tests he said that it was pretty well agreed that there is no complete paint which is suitable for all conditions of exposure, and that each paint must have the various components put together in proportions according to the conditions to which it is subjected. He believed that the engineer should design the paint which he expects to use under any given conditions. The relative values of field tests, laboratory tests and painting tests were discussed and details of methods were given. No matter what the painting test might be, the essential features to be insisted upon were that the formula of the paint should be stated fully, and that the thickness of the film, or the rate at which the paint is spread, should also be stated.

In a paper on "The Best Method of Painting Steel Cars," F. B. Cheesman criticised the method in vogue at present in car shops, admitting, however, that the defects were largely due to lack of room and other conditions over which the builders have no control. He said that in nearly all of the large car shops the practice of putting on two coats of paint in one day prevailed, the stencilling being done the same day. He believed that better results could be obtained by applying only one coat than by forcing the two coats to dry so that they could be applied inside of twelve hours. The work should be done under close inspection, the paint to be applied immediately after sand blasting. All the over-lapped joints should be repaired with a heavy coat of special paint in semi-paste form. This shop coat should be followed in the course of six months with two coats, at which time all rust should be removed by scraping with wire brushes. He considered it important that the size of the brush used be specified and that a larger brush than a No. 6 round should not be allowed. In working with wide flat brushes the paint could not be applied as well as it should be. Finally, painting should be done under cover.

In the discussion of "Standard Specifications for Preservative Coating for Steel," all mention of standard specifications seemed to be carefully avoided. Maximillian Toch gave a talk, illustrated with stereopticon views, showing a number of interesting cases of failure of paints under various conditions. He gave the members present some idea of the difficulties experienced in protecting such structures as bridges, columns and trusses, and the steel work in the subway of New York City, from rust. The discussion which followed emphasized the fact that each particular case required special treatment.

The bridge which is subjected to fumes of locomotive gases requires different treatment from that applied to a bridge which runs over a quiet stream and is subject to very little strain or traffic. Pipes subject to the action of brine can not be treated in a manner similar to those carrying live steam. As far as the component parts are concerned, the same statement applies. Every pigment and every vehicle has its proper conditions and uses.

Lewis H. Barker described "A New Method of Protecting Iron and Steel Structures by Means of Paper and Paint." The purpose of the paper, which is saturated with paraffine, is to make the film impervious to moisture. A coat of special paint is applied to the clean surface; upon this the paraffine paper is spread, and later the whole covered with another coat of paint.

J. C. Blanch discussed exhaustively the chemical action of rust upon metallic surfaces, especially in the presence of moisture and under the influence of electric currents. He brought out the necessity of excluding, as far as possible, electric currents and the desirability of introducing into the paint a material to absorb oxygen.

Dr. Dudley questioned the entire accuracy of the common saying that rapid drying paints are poor paints. He believed that the rate of drying had very little to do with durability. He said that the reason rapid drying paints gave poor results was because they had not been properly prepared. As an illustration he gave details of some experiments of especially prepared paints, one of which dried within two hours. A general discussion of the nature of the dryer, permeability of paints, blistering and specially prepared paints followed. Cyril De Wyrall discussed the conditions under which protective coatings must be applied in the New York subway. He said that they had all possible difficulties to meet except the action of sunlight. It had been found that linseed oil paint could not be used at all, for the reason that it was impossible to get a perfectly dry surface. Mr. Thompson spoke of the peculiar rust found in the subway, being identical with salt water rust, not a yellow mass, but a yellowish brown streaked with black. Mr. Dudley said that the key to the situation lay in a coating which is impervious to moisture, and he added significantly that impermeability was a good deal to expect from a coating which at most could be only two one-thousandths of an inch in thickness.

Friday Afternoon.

The sessions held in the auditorium of the New Steel Pier were devoted to the proposed revision of Standard Specifications for Iron and Steel. Committee A had been instructed to consider the revision of the specifications with a view of bringing them into harmony, if possible, with those adopted by other societies and committees. In the report the following specifications were considered: for Structural Steel for Bridges and Ships, Open-Hearth Boiler Plate and Rivet Steel, Steel Rails, Steel Castings, Steel Axles and Steel Forgings. Some modifications were recommended, together with a few additions. The recommendation regarding steel for bridges and the specifications for steel rails occasioned a passage of arms between representatives of the producers and consumers of these products, but the matter was finally adjusted with slight concessions on both sides. The entire report, with the added recommendations, will be referred to the association for consideration by letter-ballot. During the discussion Robert Job read a paper on "Some Causes of Failure of Rails in Service." He had found that failures were due mainly to three causes: piping, blow holes, and segregation. The chief cause of fracture was the presence of pipes in the rails, and the principal reason for alteration of shape, especially of the head, was blow holes. He had found that flowing was not due to softness but to blow holes, soft rails maintaining their shape but wearing away rapidly. The paper was illustrated by a number of photographs.

Saturday Morning.

Part of the session on Saturday morning was consumed in finishing the discussion of the proposed revision of specifications for steel. The assembly then passed to the report of Committee B on Standard Specifications for Cast Iron and Finished Castings, and the proposed Standard Specifications for Car Wheels and Gray Iron Castings. The reports were not read in full, only those portions which had to do with weight, height of drop and number of blows in the sections on car wheels being concerned. Dr. Dudley explained that the increase in weight of cars rendered desirable a change in the specifications, heavy cars requiring heavy wheels and heavy wheels requiring a more severe test. The recommendation was approved by the assembly and the modified specifications will be submitted to the association for decisions by letter-ballot. A paper by E. L. Hancock, named "A Preliminary Report on Tests of Nickel Steel and Carbon Steel Under Combined Stresses," was read by Prof. Hatt. In it the author described the behavior of steel under torsional and tensile stresses applied at the same time. H. V. Willie, in "Influence of Methods of Piling Staybolt Iron on Vibratory Tests," pointed out the need of a more definite test for material of this kind, and showed that for this purpose the vibratory test undoubtedly possesses merit. Dr. Richard Moldenke, in a paper on "A Comparison of Standard Methods of Testing Cast Iron," discussed the methods employed in various countries. Dr. Moldenke's paper will appear in a later issue of *The Iron Trade Review.*

In the absence of the author, Secretary Marburg read a paper on "Hard Casting Iron, the Theory of One of its Causes," by Henry Souther. The paper was a history of an experience with a difficult working iron, the thick portions being hard and the thin parts soft. Various causes had been considered but the author believed that the true reason lay in the pressure of a peculiar carbide of iron. E. Stuetz described the "Thermit Process in America," illustrating his talk with stereopticon views. The method of applying the process, results thus far achieved, and future possibilities, were considered.

At the meeting of the committee on foundry coke, the following officers were chosen: C. H. Zehnder, of Rogers, Brown & Co., chairman, and Dr. Richard Moldenke, secretary.

Saturday Afternoon.

The Saturday afternoon session was given up to miscellaneous subjects. L. W. Page, chairman of committee H, on Standard Tests from Road Materials, described the method employed by the U. S. Government in testing rock employed for making roads. The test for toughness was made by impact upon a test piece of standard dimensions. The report contained also a standard method for the analysis of bituminous paving material. Henry J. Hartley presented a report of committee R, on Boilers, the chairman, E. D. Meier, being absent. The discussion was practically limited to the efforts which have been made by several associations to secure some revision of the boiler laws. It appeared that the steamboat inspection service is governed by a code of archaic laws which are greatly in need of revision. The co-operation of the society in securing the attention of the government was solicited and a motion to grant assistance in every way possible was passed. R. D. De Wolf discussed specifications for cotton tapes for electrical purposes, describing the difficulties to be met, and the conditions under which the test should be made. A motion for providing a committee on tempering and testing steel springs was referred to the executive committee. Robert A. Cummings described, with the aid of stereopticon views, a large hydraulic testing machine for uniform loads. This machine was largely extemporaneous and served its purpose, for testing reinforced concrete beams, admirably. A paper on "Rail Sections as Engineering Structures," by P. H. Dudley, was read by title. After which the president announced the close of the most successful meeting in the history of this association.

PERSONAL.

John Pengilly, of Ely, Minn., whose severe illness was mentioned last week, is recovering very rapidly, and is now about out of danger.

Harold U. Wallace, son of John P. Wallace, who has just resigned the chief engineership of the Panama Canal Commission, has accepted the third vice presidency of J. G. White & Co. Mr. Wallace resigns as chief engineer of the Illinois Central railroad to accept this position. He has been connected with that road since 1894, and since 1902 has been its chief engineer. Among other important work carried out for the Illinois Central railroad by Mr. Wallace was the lake front improvement at Chicago, which included the depression and reconstruction of twenty miles of main lines and yard tracks.

W. E. Farrell, for many years manager of the Birdsboro Steel Foundry & Machine Co., announces that he has severed his connection with that company to accept the vice presidency of M. H. Treadwell & Co., of Myerstown and Lebanon, Pa. Mr. Farrell will be located at Lebanon, having entire charge of the plant at that place.

As the result of recent changes at the Edgar Thomson plant of the Carnegie Steel Co., Pittsburg, James Friehlander,

HERMAN CLARK MECHLING. ONE OF THE VICTIMS OF THE LAKE SHORE WRECK AT MENTOR.

superintendent of the electrical department of the Carnegie furnaces of the Carnegie Steel Co., will be appointed assistant superintendent of the Edgar Thomson blast furnace, to succeed Andrew E. Maccoun, who was appointed superintendent to succeed Herman Brassert, resigned. George Campbell, assistant master mechanic of the Edgar Thomson furnaces, will be appointed master mechanic.

Harry Cusack, formerly superintendent of transportation of the Homestead Steel Works of the Carnegie Steel Co., Pittsburg, has been appointed superintendent of transportation and labor of the Carrie blast furnaces owned by that company.

George M. Summers, of Youngstown, O., has been appointed general manager of the plant of the Sligo Iron & Steel Co., Connellsville, Pa.

Chairman Don H. Bacon, of the Tennessee Coal, Iron & Railroad Co.' s executive board, has announced the appointment of M. P. Gentry Hillman as general manager of blast furnaces for the company. Mr. Hillman is a man of considerable experience in furnace construction and management. His appointment became effective July 5. It appears that the new policy is to have general managers of departments instead of one general manager as before, which position Charles McCrery, vice president, held. Mr. McCrery is now with the Woodward Iron Co.

OFFICIALS OPTIMISTIC.

Although Report of American Car & Foundry Co. is not Favorable.

The annual report of the American Car & Foundry Co., which was read at the stockholders' meeting in Jersey City, June 29, shows that net earnings for the year ended April 30 last, are smaller than those of the previous year by $1,831,000. The surplus after the preferred dividend for the year is given at $528,118, or a decrease of $968,000. The total surplus now stands at about $12,700,000. There has been a decided change for the better in trade conditions since the period covered by the report, and officials of the company are optimistic regarding the outlook for new business. In this connection President Eaton said that the company now has orders for 44,000 cars on its books, being the high record mark as compared with this time in any preceding year. He also stated that the output of cars during the past year aggregated 35,857, including all types being a decrease of about 30 percent as compared with the preceding year.

After meeting the full 7 percent requirements on the preferred stock and charging off liberally for renewals, repairs, etc., and new construction charged off, the company shows a surplus equal to 1.76 percent on the common stock. Following is the statement of working capital: Working capital, April 30, 1904, $14,627,156; add surplus earnings year ended April 30, 1905, $528,118; less: expended for Memphis plant, additional real estate, and reserved for part payment on Wilmington plant, included in property account, $505,138; working capital, April 30, 1905, $14,650,136.

At the annual meeting the retiring board of directors was re-elected. The board met in the afternoon to organize, when William C. Dickerman was chosen third vice president, an office that has been vacant for several years.

Crane Company is Celebrating.

Crane Co., Chicago, is celebrating this week the fiftieth anniversary of the founding of the firm. All of the company's agents from the nineteen branch offices located in as many different cities throughout the country arrived in Chicago Monday for the celebration. Headquarters are at the Auditorium Annex. Monday evening a dinner was given, followed by a trip to the White City. Tuesday was spent at the summer home of R. T. Crane, the head of the firm, at Lake Geneva. On Thursday a picnic will be given to the employes of the firm at one of the city parks. It is expected that 13,000 persons will attend this outing.

The Johnson-Peter Co., House building, Pittsburg, has been organized by C. S. Johnson and E. E. Peter, both of whom have had a wide experience in the iron and steel business. This company represents the Tyler Tube & Pipe Co., Washington, Pa., manufacturer of pipe and boiler tubing, and the Baldwin Steel Co., crucible steel manufacturers, located in New York. Mr. Johnson is also manager of the Pittsburg office of the Abendroth & Root Mfg. Co., of New York, and recently secured an order for $200,000 worth of spiral pipe, twelve and thirteen inch, for shipment to Mexico.

The Rosena, Shenango and Red Jacket furnaces of the Carnegie Steel Co., New Castle, Pa., which were banked about two weeks ago, will resume operations on Wednesday, July 5. The Bessemer steel plant which was also closed at about the same time, will resume on Monday, July 12. The two tin plate plants at New Castle have been closed for an indefinite period and will not resume until something more definite is done with reference to the 1905-06 wage scale.

H. R. Worthington Hydraulic Works.

NEW PLANT OF THE INTERNATIONAL STEAM PUMP CO. AT HARRISON, N. J.

The new plant of the Henry R. Worthington branch of the International Steam Pump Co., recently completed at Harrison, N. J., is the greatest establishment for the manufacture of pumps in the world, and is by far the largest industrial plant in the neighborhood of New York City. The buildings will accommodate about 6,000 workmen and were erected at a cost of more than $2,000,000. One building alone, the machine shop, covers over 130,000 sq. ft. of ground, and the total floor area of the plant is 18 acres. The plant takes care of the work formerly handled at the works at Brooklyn, N. Y., and Elizabethport, N. J., but its capacity is many times larger than that of the two plants combined. The products include steam, electric and power pumps, centrifugal pumps, condensers, cooling towers, water meters and many other hydraulic and steam appliances.

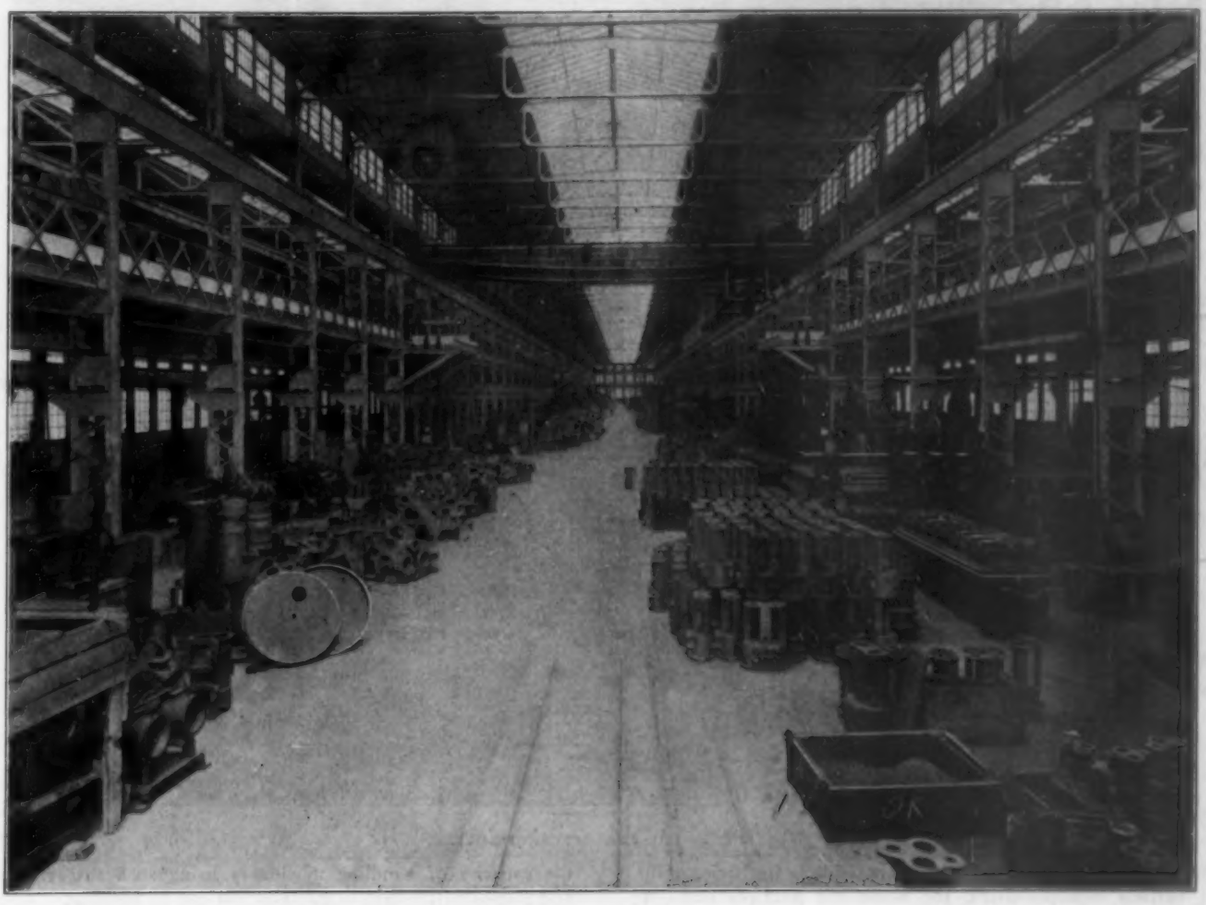


FIG. 1—GENERAL VIEW OF MACHINE SHOP FROM SOUTH END.

The geographical location of the plant—on the edge of the Hackensack Meadows between Newark and New York City—has been chosen to obtain the greatest economy of transportation. The Erie, Lackawanna and Pennsylvania railroads afford facilities for railway shipment to every part of the country and to tidewater for export. Spurs from the railway tracks enter each building in which manufacturing is carried on, permitting the raw material to be delivered at the point of use and machinery to be loaded on cars and prepared for shipment in the shops where it is finished.

The buildings are arranged in two groups, so planned that the materials progress regularly from department to department from the time when the pig iron enters the storage yard near the foundry until the finished machine leaves the testing floor in the erecting shop to be loaded upon the freight car for shipment. The foundries, pattern warehouses and shop and auxiliary buildings form the southern group; between this group and the machine and erecting shops, the power house, the blacksmith shop and the other buildings, which form the northern group, is the main yard and entrance to the plant. This is supplied with tracks and facilities for reaching every building on the premises.

Machine and Erecting Shops.

The machine and erecting shops are three large buildings connected so as to form one. The main shop, 1,008 ft. long and 120 ft. wide, runs parallel to the low erecting shop, which is 600 ft. long and 120 ft. wide. Connecting these two buildings is the high erecting shop, which is 210 ft. long, extending for some distance into the main machine shop at one side and the low erecting shop upon the other. Standard gauge tracks pass through the main bays of the buildings, so that castings may be brought from the foundry upon flat cars, deposited at any point, and the finished machines may be loaded wherever they happen to be completed. Numerous windows admit an abundance of light to all parts of the shops and when daylight fails, arc lights supply ample illumination. Every room is supplied with drinking water and toilet arrangements. The latter form an attractive feature of the entire plant, the toilet rooms being constructed on sanitary principles, conveniently placed so as to be easily accessible and to encroach upon valuable space as little as possible.

Wherever an unobstructed ground floor space is desirable, the toilet rooms are placed upon galleries or upon a sort of mezzanine floor.

Main Machine Shop.

The main machine shop is divided into a center bay and two side bays. A gallery runs the entire length of the one side and another 600 ft. along the other, the high erecting shop causing an interruption of some 180 ft. Three electrically operated and driven bridge cranes of 59½ ft. span, one of 15-ton capacity and two 20-ton capacity, command all parts of the center bay. On the side bays there are seven 2-ton and five 1-ton electrically operated and hand travel cranes of 27 ft. span.

The building contains upwards of 300 machines, the entire equipment not as yet being in place, new drills, new lathes and other appliances being added daily. Among those already in place are the following: Single boring mills, 21; double boring mills, 24; vertical boring mills, 16; side beam boring mills, 2; vertical multiple drills, 10; horizontal multiple drills, 1; gooseneck drills, 4; radial drills, 32; facing machines, 1; grinders, 6; large lathes, 30; milling machines, 4; planers, 16; rotary planers, 3; seating machines, 2; slotters, 1; studding and tapping machines, 3; shapers, 2. On the galleries are the following: Bolt cutters, 2; centering and pointing machines, 4; nut tapping machines, 3; pipe cutters, 3; cold saws, 4; steel cutters, 15; double horizontal boring mills, 8; vertical boring mills, 15; gooseneck drills, 20; multiple drills, 2; drill presses, 13; radial drills, 3; grinders, 17; key seating and slotting machines, 5; monitor turret lathes, 9; regular turret lathes, 26; Potter & Johnston turret lathes, 9; Fitchburg engine lathes, 24; Putnam engine lathes, 14; miscellaneous engine lathes, 51; milling machines, 34; planers, 2; grinding and polishing machines, 24; shapers, 3.

The machines on the main floors are driven by individual motors. On the gallery they are arranged in groups, each served by 200 ft. of motor driven shafting. Of these sections of shafting, there are four on one side and three on the other. The shop is equipped with hydraulic elevators of five tons capacity, three on one side and two on the other. The equipment is so arranged that machines of any size can be handled with ease.

High Erecting Shop.

The high erecting shop contains one center bay 62 ft. high under the hook of the crane and four galleries on each side. In the main bay there is a 30-ton crane electrically operated and driven with two of 5-ton capacity. On the lower floors of the side bays, two electrically driven 2-ton elevators serve all the galleries, the elevators being placed in diagonally opposite corners of the building. In this shop all the large pieces of machinery are assembled, the dimensions of the space and the capacity of handling machinery being such that engines and pumps of the largest construction can be handled.

FIG. 2—THE LOW ERECTING SHOP.

The Low Erecting Shop.

The low erecting shop has a center and two side bays with a gallery on each side; there are two 10-ton, and one 15-ton electric bridge cranes in the center bay. In the side bays there are four 5-ton cranes which are electrically operated and driven and three 1-ton electric lift and hand travel cranes. There are seven 2-ton electric lift jib cranes and nineteen 2-ton jib cranes in the machine shop. Small parts not exceeding 500 lb. in weight are taken to a store room, where they are inspected and put upon shelves ready for assembling.

The blacksmith shop occupies a separate building 42 ft. wide and 200 ft. long and one story high. In these eight blacksmiths and eight helpers are regularly employed. The equipment consists of eight fires, one 2-ton jib crane, one 1,500-lb. steam

hammer, one 1,000-lb. steam hammer, and one 500-lb. steam hammer. A building separated by a wall into two parts is devoted to the testing and storage of finished machines. The testing portion is 200 ft. long and the warehouse 275 ft. long. The testing room is equipped for steam and water pressure tests, numerous connections being conveniently situated.

The Foundry Yard.

The foundry yard lies in the space between the main and molding machine foundries. The surface, which is graded and covered with gravel, is divided into rectangular sections by the depressed track system, 30 in. gauge tracks running at right angles to the standard gauge railway tracks. The yard is equipped with a 5-ton jib crane of 50 ft. radius; and a 15-ton traveling locomotive crane commands all parts of the yard. Most of the handling is done by hand trucks on the industrial system of tracks.

Near the center of the yard in a separate building is the laboratory. All raw materials received are subjected to chemical analysis and the foundry mixtures are made up so as to produce a product of definite composition. Two testing machines, transverse and tensile, form a part of the laboratory equipment.

The Pattern Shop.

There are in reality three pattern shops, divided into as many different rooms, each 150 by 75 ft. About 75 men are employed in these shops. The equipment includes six band saws, two of which tilt in either direction. There are three surface planers, one carrying 30 in. knives capable of planing stuff of any thickness and fitted with a table which tilts 20 degrees in either direction. Of lathes there are five of the regular style and four post lathes. There are two dozen trimmers, the largest of which is capable of cutting a piece of wood 8 by 20 in.; two thickness planers, which plane stuff 20 in. wide and 6 in. thick. Glue is supplied by six Hadaway electric heaters. Metal patterns are fitted in the machine shops, a space about 40 by 60 ft. being devoted to this work. Twelve men are regularly employed in the metal pattern department. For the storing of patterns a building 500 ft. long, 75 ft. wide and four stories high is provided. Patterns are stored upon shelves supported by metal posts and adjustable brackets; metal patterns are arranged upon iron shelves and racks of special design. A card index gives at once the location of any pattern in the building. The construction is of the slow burning variety of brick and wood. The sprinkler system for fire protection is installed on all floors.

Main Foundry.

The main foundry occupies a building 600 ft. long by 100 ft. wide. The space is divided into a center bay 60 ft. wide and two side bays each 40 ft. wide. In the center bay there are two 30-ton and two 20-ton bridge cranes operated and driven electrically. In the side bays there are four 10-ton cranes all electrically driven and operated. The main foundry contains, besides these, five 15-ton wall jib cranes also electrically operated. Metal for the main foundry is supplied by two cupolas of 84 in. shell and 72 in. diameter inside of the lining, the capacity being 36 tons per hour. The air is supplied by rotary blowers driven by 75-h. p. electric motors. The main foundry has 5,000 sq. ft. of core oven surface. The doors of the oven are equipped with roller shutters. The ovens are of the company's own design and are constructed of brick; they are fired by either coke or gas.

The work done in the main foundry includes loam, dry sand and green sand operations; it is used only for large pieces.

FIG. 3—GENERAL VIEW OF THE POWER HOUSE.

About 350 men are regularly employed in this department. During a visit to the foundry, eight condenser shells, each 9 ft. in diameter and 16 ft. long, were in course of construction; at that time the foundry was also engaged in preparing castings for the low pressure cylinder for a 40,000,000 gallon pumping engine for the Chicago Water Works. Pieces weighing up to 25 tons are cast without difficulty.

A novel feature in the foundries of the plant is the equipment for cleaning castings. In the main foundry a space 140 ft. wide by 75 ft. long is provided with a cellar or basement over which the main floor is built of concrete and steel construction. In this floor there are 3 by 5-ft. openings placed at intervals. These are covered with iron gratings of bars 1 by 3 in. and separated by 1½-in. spaces. The castings are placed upon or near these gratings and the sand removed from the rough pieces is allowed to drop through the gratings into the cellar below. A belt conveyor delivers the material to an electrical separator, the sand being then conveyed to a car on a track outside and the shot iron to an elevator which deposits it in a car which returns it to the cupola.

The object of this arrangement is to provide a clean floor space for working, allowing all hot sand from castings to pass out of the way and prevent the annoyance to workmen caused

by heaps of sand and rubbish. All large loam jobs are also taken upon this floor and knocked down, the material going to the cellar and afterwards being separated and brought back to the place designed for it.

The cores for the main foundry are prepared in a room 75 ft. long and 140 ft. wide. Cores up to 500 and 1,000 lb. each are prepared in this room, the work being done by women, about 25 of whom are employed.

A 30-in. gauge track system with turntables gives access to all principal parts of the shop. The sand storage building, 250 ft. long and 35 ft. wide, forms a part of the main foundry. This building is divided into bins for the different grades of material required. The sand is delivered in drop bottom cars, dumped into a pit elevated to the top of the sand sheds by a bucket chain conveyor and deposited on a 24-in. belt conveyor, which runs the entire length of the building and is provided with an automatic dumping device which can be set to discharge at any point.

In the center bay are three large molding pits, each 15 x 30 ft. and 15 ft. deep, in which the larger pieces are handled.

Machine Molding Foundry.

The molding machine foundry is 400 ft. long and 65 ft. wide and has a sand cellar or basement the entire length of the building. The foundry is divided into floors, 12 ft. wide by 30 ft. long, with a gangway 5 ft. wide along the center. Each floor section is equipped with a traveling crane of one ton capacity, electrically operated and with hand travel, so that each operator has the exclusive use of his own floor space and his own crane. In the center of each floor space is a grating 3 ft. wide and 20 ft. long. Each section is equipped with molding machines of the various types and provided with a bucket elevator.

As the molds are taken from the machines, they are set down as near the gangway as possible, where they are poured off by a separate gang of men, and as soon as cool enough the castings are dumped, when they are disposed of by another gang of men. The sand passes through the grating to the cellar below, where it is cooled, tempered and shoveled into the conveyor, which runs from the cellar to the molding floor, and deposited on a bench before the molding machines.

The object of this system, which is due to the ingenuity of W. L. Prince, superintendent of the foundries of the International Steam Pump Co., is to reduce the floor space required for a given amount of work. As the cupolas melt during the entire day, the molds are poured as soon as finished, and the castings dumped and gotten out of the way with a minimum loss of time. To illustrate what may be done with this system, Mr. Prince stated that one machine upon a floor of the dimensions given has produced 100 flasks a day, the size of the flask being 21 ft. square. To accomplish the work performed in this foundry in the old way would require a floor space at least five times as large. The system reduces the size of the foundry, it brings the work closer to the cupola, allows the mold to be cast before dampness can be absorbed by the cores and has accomplished what the foundry business has long been seeking—a continuous founding process without the expense of an elaborate conveyor system, which requires the services of as many machinists as the molders which it serves. The system here described provides an industrial conveyor for each operator, so that if one is out of order the remainder of the shop remains unaffected.

There are two cupolas in the machine molding foundry, each 60 in. in diameter of shell and lined down to 48 in. One cupola is operated in the forenoon and the other in the afternoon. This lengthens the life of the linings, which amply makes up for the additional fuel required. The air is supplied by rotary blowers operated by independent 50-h. p. electric motors. The metal is conveyed to the floor sections by ladles mounted upon trucks.

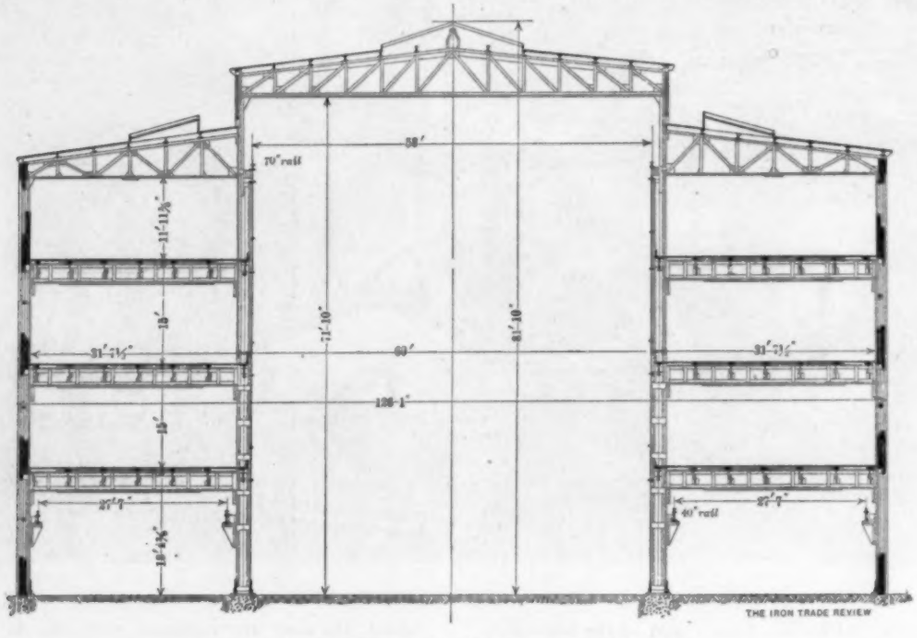


FIG. 4—CROSS SECTION OF THE HIGH ERECTING SHOP.

A room at one end of the building is devoted to the preparation of cores. In this room all cores used in the building are made by girls, the cores ranging in weight from one ounce to 1,000 lb. At one side of this room are sixteen Millet core ovens and four brick ovens, 10 x 20 ft.; these are supplied with roller shutter doors and with special cars fitted with roll bearings. The fuel employed is either gas or coke. Under the core shop all the sand for the foundry and core room is stored. Here also the operations of mixing are performed, the mixing being accomplished by mechanical sand mixers of the revolving cone type, another invention due to Mr. Prince. The prepared sand is conveyed to the shop above by bucket elevators.

Cleaning Room.

Annexed to this building is the cleaning department, 200 ft. long by 60 ft. wide. The building contains a 5-ton crane, electric operated and travel, and all the latest and most up-to-date cleaning appliances. There are four sand blast rumblers

and two sand blast rooms, each 20 ft. square, with gratings through which the sand is drained by an exhaust system into settling tanks, afterwards to be returned to the sand blast apparatus. In addition there are six Sly rumbling barrels, each 60 in. in diameter and 70 in. long, driven by electric motors by means of shafting. Chipping is performed by pneumatic chippers, transverse connections for air pressure being provided. A Rockwell annealing furnace, in which small parts are annealed, is in the chipping room. Castings are taken from the cleaning room by standard gauge cars and hauled directly to the machine shop. At the time of the visit about 75 men were employed in the machine molding foundry and about 30 in the chipping room. About 25 girls attended to the operations of the core shop.

Brass Foundry.

The brass foundry is located at the end of the foundry yard, between the machine molding and the main foundry. The building is 200 ft. long by 100 ft. wide, and is divided into a center bay and two side bays. A 3-ton traveling crane commands the floor of the center bay, and the side bays are equipped with a Coburn trolley system. For melting metal there are five Schwartz furnaces, one of 4,000 lb., two of 2,000 lb. and two of 1,200 lb. capacity for each heat, and three No. 150 and three No. 200 crucible furnaces. Only the small parts are actually cast in the brass foundry, the large pieces being handled in the main foundry, whither the molten metal is transferred by the industrial track system. Brass castings weighing as much as five tons each are produced. The brass foundry has molding machines of various types; castings are cleaned by the sand blast method and by water barrel rumblers, pneumatic chippers and grinders with carborundum wheels. All refuse is put through grinding mills and electric separators.

The furnaces are operated by crude oil or gas. At the time of the visit fuel was drawn from tanks of crude oil stored under gound in the yard, but a gas plant is under construction and it is expected that this fuel will be used exclusively.

The building has metal vaults, 20 by 20 ft., where all stock is stored. Over each bay is a galley provided with an elevator, which receives material returned from the machine shop. It is here separated into its component parts and put into bins, whence it can be delivered by the storekeeper to the furnaces as called for. About 35 men are at present employed in the brass foundry.

Cost System.

The method of keeping the cost accounts in the foundries of the International Steam Pump Co. possesses several original features and many advantages. The accounts are divided into "Green Sand Castings," "Dry Sand Castings," "Loam," "Machine," "Cleaning," "Chipping," "Expense," "Molding," and "Iron Casting Production." The tabulated accounts show the total cost per pound, so that the management is able to tell from month to month the exact cost per pound of product for each operation. Tabulated accounts are kept of the daily productions, daily pay roll, productions per molder, productions per helper, number and percentage of poor and good castings, and cost of patterns per pound. By means of this method it is possible to determine at a glance any increase or decrease in cost and to detect at once the cause. The method of keeping the separate labor accounts is simplified by an ingenious numbering device. Thus the men in one department or room are numbered from 1 to 100; those in another department from 200 to 300, and so on. The names are easily classified by reference to the numbers. This cost system is also due to Mr. Prince, the superintendent of foundries.

Power House.

The power house, 174 ft. in length, is divided into an engine room, 49 ft. wide; boiler room, 50 ft. and coal pockets 14 ft. wide. There are six Babcock & Wilcox boilers, 330 h. p. each, and two 500-kilowatt engines, each making 150 revolutions per minute and directly connected with an electric generator. There are in addition an elevator pump and three air compressors.

The boiler furnaces are connected with a chimney of 9 ft. internal diameter and 200 ft. high. The coal for the furnace is stored in bins along the boiler house, the bins being built of concrete with the bottom about four feet below the boiler room floor. They are filled with coal up to the boiler room floor level, where a temporary floor is formed with tar and fine coal. Above this the bins are filled with coal for regular use, that below the temporary floor being reserved indefinitely for emergencies. The coal cars are pushed up an inclined track and dumped directly into the top of the coal bins or through chutes to the boiler room.

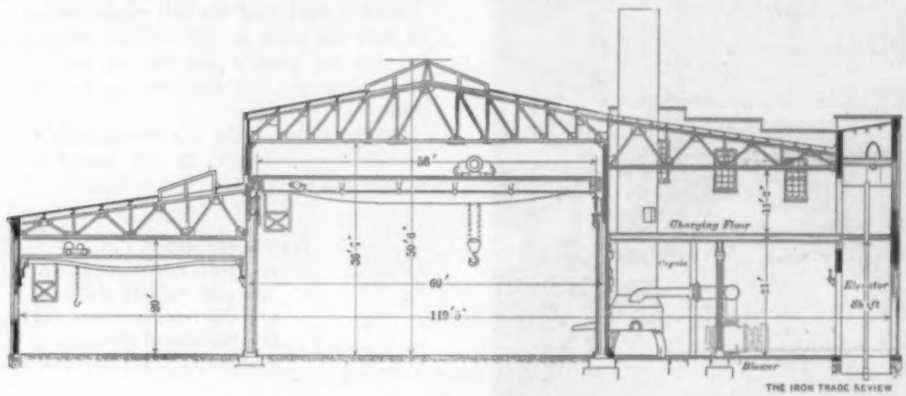


FIG. 5—CROSS SECTION OF THE MAIN FOUNDRY.

Water for drinking purposes, for fire protection and other purposes is obtained from four 8-in. driven wells, 350 to 500 ft. deep, having a tested capacity of 1,350 gallons per minute. The water is raised from the well by compressed air and is delivered to a large reservoir having a capacity of 1,000,000 gallons. The water for drinking purposes and for the lavatories is, however, pumped directly from the wells to insure the greatest possible coolness. The fire mains are supplied by two Worthington fire pumps, each having a capacity of 1,500 gallons per minute. Fire hydrants are placed at frequent intervals through the yards and hose reels are distributed through the shop. In addition all buildings are equipped with an automatic sprinkler service supplied from a 100,000 gallon tank on a tower 150 ft. high. The fire protection system has been described in detail in *The Iron Trade Review*.

The Chattanooga Roofing & Foundry Co., of which J. E. Annis is president, has purchased the grate business from the Cahill Iron Works, and this business will be transferred to the Chattanooga plant. In order to accommodate the new business, which includes the patterns, foundry equipment, etc., of the Cahill works, Mr. Annis will erect a large addition to his present plant.

OBITUARY.

Colonel Chas. N. Alexander Jewell, Hartford, Conn., died June 25 at the age of 64. At the time of his death he was treasurer of the Jewell Belting Co., of Hartford, having served that company in the same capacity since its incorporation in 1883. He was also treasurer of the Jewell Pin Co. and was connected with several concerns bearing the Jewell name. He was the youngest son of Pliny Jewell and was born in Winchester, N. H., March 29, 1841. After being graduated from the Hartford High School he became a clerk, later an apprentice and afterward a partner in the firm of Pliny Jewell & Sons. He served in the Civil War as adjutant of the Twenty-second Connecticut Volunteers. He held various offices of financial and business trust in that city and was for years president of the Hartford Young Men's Christian Association, was

FIG. 6—THE HIGH ERECTING SHOP.

a Knight Templar, and was active in the G. A. R. and similar veteran associations. He is survived by a widow.

William Gardam, founder of the firm of William Gardam & Sons, makers of drill presses and general machinists, New York, died June 26. His death was the result of injuries received at a fire at his home, No. 4923 Third avenue, Brooklyn. Born at Leeds, England, more than eighty years ago, he came to this country in middle life and began the manufacture of surveying and astronomical instruments, which business has developed through several changes into its present position of note.

R. S. Sayer, treasurer of the Rider-Ericsson Engine Co., of New York., was the victim of a sad automobile accident in which he and his wife were instantly killed and their two sons seriously injured on June 14. Mr. Sayer was also connected with the Delamater Iron Works.

The ingredient "martensite" of steel, though detected and identified by the microscope, has never been isolated. It seems to be a specialized interlacing of ferrite and cementite.—[Engineering and Mining Journal.

BELT CREEP.*

BY WM. W. BIRD, WORCESTER, MASS.

The question of the minimum amount of slip of a belt in transmitting power from one pulley to another, reduces itself to a question of creep, for it is possible to have belts large enough so that with proper tensions there will be no regular slip. With a difference in tension on the two sides and elasticity in the belt, creep however is bound to take place. What

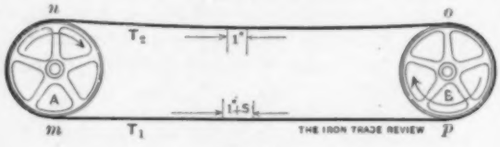


FIG. I.

does it amount to and what allowance should be made for it?

In Fig. 1 let A be the driver and B the driven, T_1 the tension in the tight side of the belt and T_2 in the slack side, the pulleys and belt running in the direction indicated. One inch of slack belt goes onto the pulley B at o and at or before the point p, it feels the effect of increased tension and stretches to $1 + s$ inches. It now travels from p to m and goes onto pulley A while stretched. At or before reaching the point n, as the tension decreases it contracts to one inch and so completes the cycle.

With a light load the belt creeps ahead of the pulley B at or near the point p. If the load is heavy, the creep works towards the point o and the belt may slip; this also takes place when the belt tensions are too light even with small loads.

On the pulley A the belt creeps back relative to the pulley surface at n and as in B may extend to the point m when regular slip will occur.

Notation.

Let x = per cent. of slip.
v_1 = pitch velocity of driver.
v_2 = pitch velocity of driven.
t = difference in tension per square inch.
E = modulus of elasticity.
s = stretch in one inch due to t.

$$x = \frac{v_1 - v_2}{v_1}, \quad \frac{v_1}{v_2} = \frac{1+s}{1}, \quad \frac{E}{t} = \frac{1}{s}, \quad x = \frac{s}{1+s} = \frac{t}{E+t}.$$

Table I gives the percent of creep for various tensions and values of the modulus of elasticity.

TABLE I.
PERCENT CREEP.

Effective Tension per sq. in.	Modulus of Elasticity.			
	5,000	10,000	15,000	20,000
75	.49	25	.17	.12
100	1.96	.99	.66	.50
125	2.44	1.23	.83	.62
150	2.91	1.48	.99	.74
175	3.38	1.72	1.15	.87

In order to determine a value for the modulus, a number of experiments were made on 4 and 6-in. single and double endless leather belts. The tension in the tight side was taken as 50 lb. per inch of width for single belts and 80 for double. The tension in the slack side, 20 for single and 32 for double. The belt testing machine in the engineering laboratory of the Worcester Polytechnic Institute was used, the dynamometer being removed so that the belts ran without load. The sum of the tensions being made twice the desired tension, first for the tight and then for the slack side, changing as rapidly as possible from one to the other, the belt running about 1,000 ft. per minute horizontally. Readings were taken on a scale

*Presented at the Scranton meeting (June, 1905) of the American Society of Mechanical Engineers.

which showed the distance between the centers of the two 18-in. pulleys which were used. In this way what might be called the running modulus of elasticity was determined for the given range of tensions. Table 2 gives the results, being the average of ten tests for each belt.

With an ordinary leather belt running under the conditions named, which are generally considered good practice, the creep should not be over one percent.

Figs. 2 and 3 are front and rear views of a model for showing creep. The two pulleys are the same size, one being connected to a dial and the other by gears and shafts to a pointer on the dial. The driver is turned by a crank and pinion, while a brake on the driven supplies the load. In this way the creep is shown, and by using an elastic band the driver may run twice as fast as the driven without regular slip. The gears and pointer on the left hand side of the model are for the purpose of showing the speed of the belt as it goes onto each pulley, which is simply another way of showing creep.

TABLE II.

Belt.	Area of Cross Section.	T_1	T_2	$T_1 - T_2$	Tension per Sq. In.	Length.	Stretch.	Modulus of Elasticity.	Corresponding per cent. of Creep.
4" single...	.86	200	80	120	139.53	295.3	2.095	19.665	.70
6" single...	1.34	300	120	180	134.33	293.6	2.035	19 475	.67
4" double ..	1.3	320	128	192	147.69	293.2	1.992	21.240	.67
6" double ..	2.02	480	192	288	142.57	294.0	1.962	21.360	.66

In connection with these experiments it was found that the

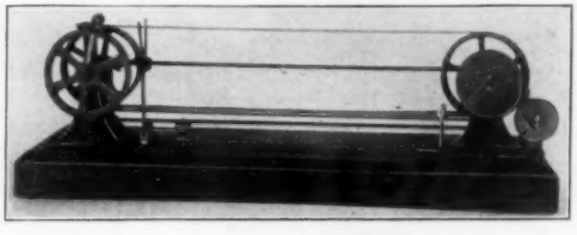


FIG. 2.

modulus of elasticity of leather belting was a very uncertain quantity, the regular testing machine methods giving all kinds of results. That it varies in actual working condition has been shown by numerous experiments reported to this Society, which show that the sum of the tensions increases with an increase in the difference of tensions or load, the distance between centers remaining constant.

As the method employed in getting values of E in the tests

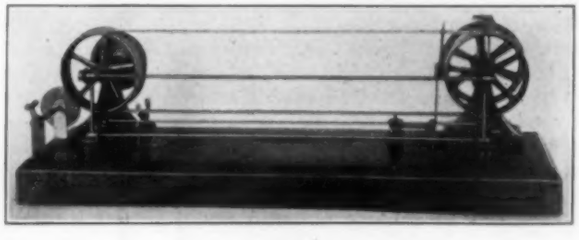


FIG. 3.

in Table 2 gave uniform results, the same plan was used for an investigation as to how the modulus varied for smaller changes in the difference of tensions. These experiments were made first on a 4-in. single endless belt running about 1,000 ft. per minute without load. Starting with 300 lb., which would be about the sum of the tensions for ordinary conditions, it was decreased 25 lb. and then increased 25 and so on, as given in Table 3. This corresponds to what takes place in practice, the tension is uniform with no load, decreases in the slack side and increases in the tight as the load comes on. After allowing the belt to run long enough at 300 lb. or 150 tension to adjust itself, the sums were changed as rapidly as possible and the distance between centers noted.

TABLE III.

No. Test.	Tension.	Length.	No. Test.	Tension.	Length.
1	150.0	296.60	9	300.0	297.32
2	137.5	296.40	10	87.5	295.98
3	162.5	296.78	11	212.5	297.46
4	125.0	296.18	12	75.0	295.08
5	175.0	296 96	13	250.0	297.64
6	112 5	295.94	14	62 5	294.76
7	187.5	297.14	15	227 5	297.78
8	100.0	295.68			

Fig. 4 shows the curve for these results.

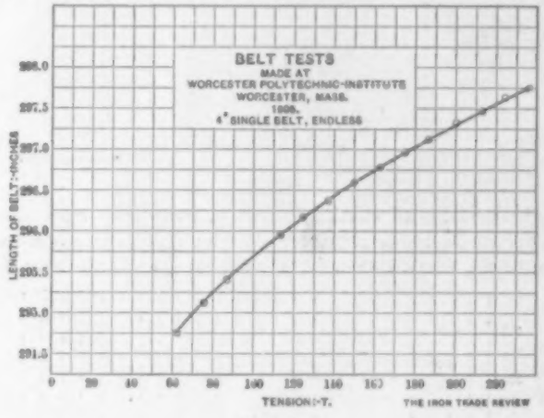


FIG. 4.

By combining these experimental results so that the sum of the tension in each case is 300, the lengths of the belt for various differences of tension are obtained by taking half of the sum of the lengths corresponding to the given tensions.

Table 4 gives the result of these combinations and the lower line in Fig. 5 the corresponding curve.

TABLE IV.

Tests.	$T_1 + T_2$	$T_1 - T_2$	Length.
1	300	0	296.60
2-3	300	25	296.59
4-5	300	50	296.57
6-7	300	75	296.54
8-9	300	100	296.50
10-11	300	125	296.43
12-13	300	150	296.36
14-15	300	175	296.27

Regular tests of the same belt run on the belt testing machine before the absorption dynamometer was taken off, gave the results given in Table 5. The sum of the tensions, however, was greater in these tests, but the dotted curve in Fig. 5 shows that the belt decreases in length with increase of load in actual tests in about the same way as shown by the combination curve in the same figure. In actual practice where the distance between the centers remains constant, the sum

TABLE V.

Tests.	$T_1 + T_2$	$T_1 - T_2$	Length.
201	400	103 8	297.22
203	400	158.4	297 14
203	400	173.0	297.02
204	400	207.0	296.88

of the tensions increases with the load, for the reason that starting with a uniform tension, as the load comes on, the amount of stretch on the tight side, corresponding to the increased tension is not as much as is required to relieve the tension in the slack side of an equal amount. Therefore in order to get a given difference in tension, it is necessary to increase the tight side more than the slack side is decreased, or, in other words the sum of the tensions increases with the load.

Table 6 gives the results of tests on a 6-in. single laced belt, what would be considered as an old belt, and Fig. 6 gives the corresponding curve. Table 7 is the combination of the tests and Fig. 7 the curve.

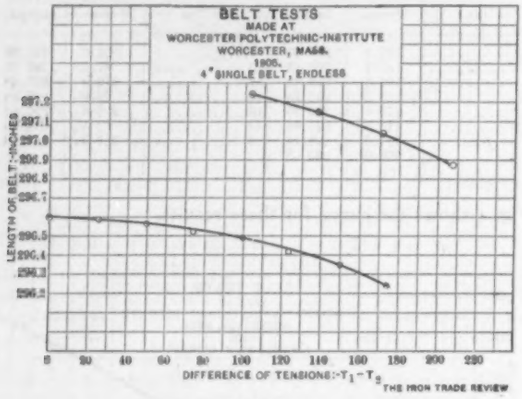


FIG. 5.

The modulus of elasticity varies in these tests from 12,000 lb. per sq. in. to about 30,000. The increase in this is largely due to the time element, for the belt would stretch more if it

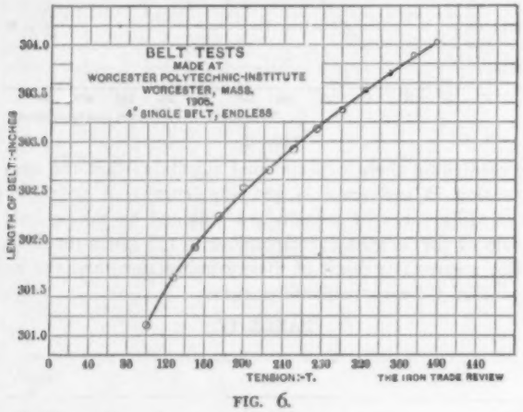


FIG. 6.

had time, but before an inch of the belt, when it is running, can stretch to a natural length for T_1, it returns to T_2 and starts to contract. The conclusion drawn is that the modulus

TABLE VI.

Test.	Tension.	Length.	Test.	Tension.	Length.
1	250	302.92	8	150	301 94
2	225	302.72	9	350	303.68
3	275	303.12	10	125	301.58
4	200	302.50	11	375	303.86
5	300	303.32	12	100	301.14
6	175	302.22	13	400	304.02
7	325	303.50			

increases with the tension when the belt is running and is probably larger the greater the speed. Allowing the belt to adjust itself for each tension statically the average value of

TABLE VII.

Tests.	$T_1 + T_2$	$T_1 - T_2$	Length.
1	500	0	302.92
2-3	500	50	302.92
4-5	500	100	302.91
6-7	500	150	302.86
8-9	500	200	302.81
10-11	500	250	302.72
12-13	500	300	302.58

E for these belts was about 12,000, while 20,000 is a fair value for ordinary working conditions.

Of course the sag in the belt varies with the tensions and has some effect on the question of the length of the belt. In these tests the 4-in. belt showed a difference of less than half an inch in the sag for the range of tension used and still less in the 6-in. belt. As the pulleys were about 10 ft. apart it can be seen that the error due to this is small.

In conclusion, the answer to the opening question is that for the common leather belt running under ordinary conditions

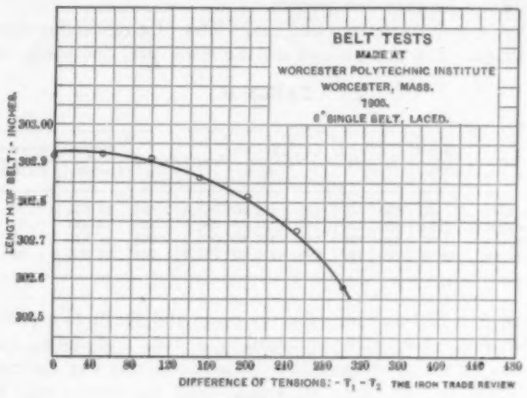


FIG. 7.

the creep should not exceed one percent. While this is sometimes called legitimate slip, it is an actual loss of power and can not be avoided by belt tighteners or patent pulley coverings.

PERSONAL.

William G. Raymond, Dean of the College of Applied Science, State University of Iowa, has had the degree of Doctor of Laws conferred on him by Washington University, St. Louis, Mo.

Chas. Francis de Nevers, M. Am. Soc. C. E., formerly general manager of the Russo-American Steel Co., Maripol, Siberia, has accepted the position of consulting engineer of the New Jersey Boiler Co., of Boonton, N. J., with offices at 95 Liberty street, New York City.

B. F. Harper, one of the sales agents of the Carnegie Steel Co. at Cleveland, has resigned.

Because of ill health, W. I. Moody, of Chicago, general manager and director of the American Rolling Mill corporation, has resigned his position and left Chicago for an extended trip through the west. His place is to be taken by L. Burnstein.

William Makemson, formerly superintendent of cupolas at the plant of the Dimmick Pipe Co., North Birmingham, Ala., has accepted a position as night blast furnace superintendent with the Thomas Furnace Co., Milwaukee, Wis.

H. Burn, formerly chief chemist of the Dimmick Pipe Co., North Birmingham, Ala., has been appointed superintendent of the cupolas, succeeding William Makemson, resigned.

Fred K. Shults, formerly connected with the Chicago and New York sales offices of the National Tube Co., as railroad representative, has accepted a position with the Camel Co., Chicago, manufacturer of railway supplies, as its New York manager.

A. N. Hobart, who severed his connection with the National Tube Co. several months ago, has resumed his position at the Chicago office of this company as assistant to H. S. Raymond, general sales agent.

John Birkinbine, consulting engineer and president of the Franklin Institute, Philadelphia, to whom reference was made in another part of this issue, has been appointed one of the members of the Water Supply Commission of Pennsylvania.

The Lewiston Machine Co., Lewiston, Me., has auctioned its entire plant to Edwin F. Scruton of that city for $15,000.

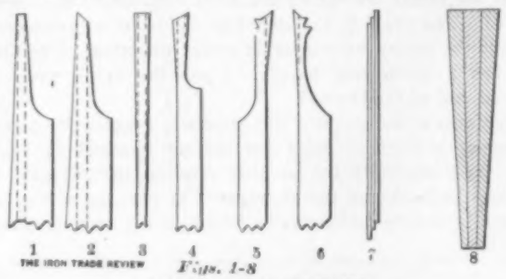
MECHANICAL PROGRESS IN GERMANY.

BY ROBERT GRIMSHAW.

Cutting-Off Tools for the Lathe.

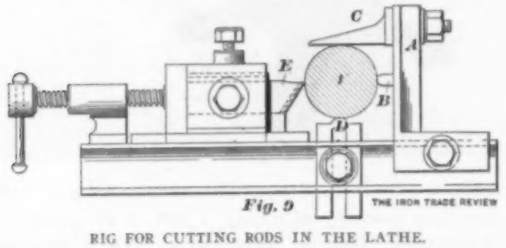
Herr Rudolf Stübling has an article in the *Deutsche Metall Industrie Zeitung* on the cut-off tool, particularly as used in the tool-post, which has so many good points that a résumé thereof is worth reproducing here.

Figs. 1 and 2 show forms that one finds, unfortunately, too often. The dotted lines show how much the sides taper the wrong way. It is no wonder that these tools bind (or rather get bound), and break. Clean work is not to be expected therefrom. Fig. 3 has the draft the right way, but its fault is that the cutting edge is parallel



SOME CUTTING-OFF TOOLS.

to the lathe-axis, so that there is usually an ugly stump left on the work-piece. Fig. 4 is better; it cuts freely, and as the cutting edge is oblique to the line of lathe-centers, there is a clean surface left on the cut-off piece. But even this shape has the fault, that as the tool is slightly bent to the left, it has a tendency to bend sidewise to the right, which leads to trouble with a thin tool that is easily broken off. In Figs. 5 and 6 we have a rather better action as regards lateral bending and such tools break up the chips by reason of their stepped cutting-edge. They are, however, difficult to sharpen. Fig. 7 shows a three-part tool which as here arranged breaks up the chip, and is easy to sharpen. Where steel of wedge form is obtainable, Herr Stübling suggests the three-part form shown in Fig. 8; but I would prefer to use strips of regular cross-section, and to grind off the outer sides of the two outer



RIG FOR CUTTING RODS IN THE LATHE.

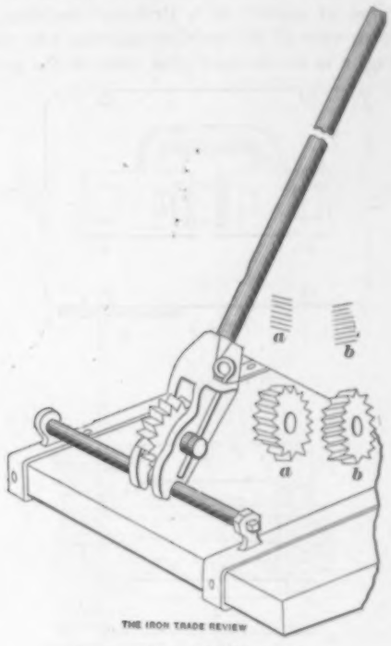
pieces, or to use two parallel pieces with a wedge-shaped one between them, and further to have the edges stepped.

In Fig. 9 there is shown a rig for cutting off rods of small diameter in the lathe. The bracket A at the back has at the height of the lathe-centers a thrust-piece B, and above, an adjustable arm C; while below the line of centers there is a friction piece D which is also adjustable in height. The cut-off tool E being kept at the height of the centers, there need be no bending of the stock F and no digging in of the tool.

Grindstone Truing Device.

The cut shows a device recently introduced into Germany, for truing off large power-driven grindstones, and which while it is manifestly a development of a little rig which has long been used in the United States for turning down small stones, is still worthy of attention on the Yankee side of the Atlantic.

Turning down a big grindstone in the old way is a hard job, not merely because it requires skill, but also because strength is needed. The truing is done at the floor level, and as water is plentifully used, no dust flies about; and what is more important there is no danger or discomfort to the workman. The loose wheels can be of steel or of chilled iron.



GRINDSTONE TRUING TOOL.

The wooden shoes of a German workman are not essential to his comfort or to the correctness of the work done by him with the tool. This device is made by G. C. Hüllstrung, Remscheid-Vieringhausen, Germany.

Blast Furnace Operations.

The Missouri furnace of the St. Louis Blast Furnace Co., which has been out of blast for repairs, will be blown in again about Aug. 1, and it is expected will produce from 150 to 180 tons daily.

The new blast furnace of the Wheeling Steel & Iron Co.. at Martins Ferry, O., is to be blown in as soon as fuel supply can be secured.

The Stewart Iron Co., Sharon, Pa., has closed down its blast furnace for repairs.

The Thomas Iron Co. is blowing in one of the Hokendauqua furnaces.

One of the large Wharton furnaces has been blown out for repairs made necessary by the weakening of the lining. Its place will be taken by the blowing of the small stack.

The Warwick Iron Co. has blown out one of its furnaces.

The Woodward Iron Co., Birmingham, Ala., reports having blown out its No. 1 furnace and blown in No. 3 this month.

The Humphrey Mfg. Co., of Towanda, Pa., with C. J. Cuddy, general manager, who can be reached at Elkhill, Va., will establish a machine shop and foundry, investing between $30,000 and $40,000.

The Weimer Machine Works Co., Lebanon, Pa., has received orders for two blowing engines for the Northern Iron Works, and hot metals cars for the Carnegie Steel Co., and the Bethlehem Steel Co.

Some New Things for the Shop, Chiefly by Way of the Patent Office.

Molding Machinery.

John A. Brodin, of Chicago, has patented a device which is here illustrated as applied to a Pridmore molding machine. Fig. 1 is a plan view of the molding machine with the pattern in place. Fig. 2 is an inverted plan view of the pattern carrier and the pattern. Fig. 3 is a vertical section on the line a-a of Fig. 1. Fig. 4 is a vertical section on the same line with the parts in another position, showing the pattern ready to be lowered after the mold has been made. Fig. 5 depicts the apparatus mounted on a Pridmore machine. Identical letters signify like parts on each of the line drawings.

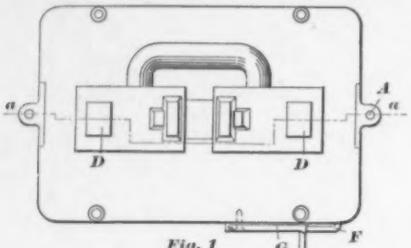


Fig. 1

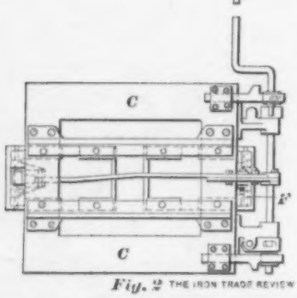


Fig. 2 THE IRON TRADE REVIEW

PLAN VIEWS OF PATTERN AND PATTERN CARRIER.

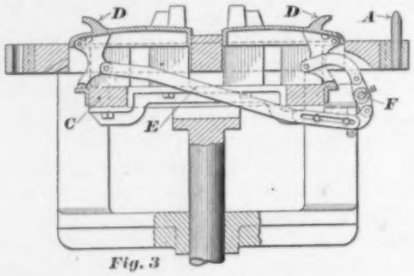


Fig. 3

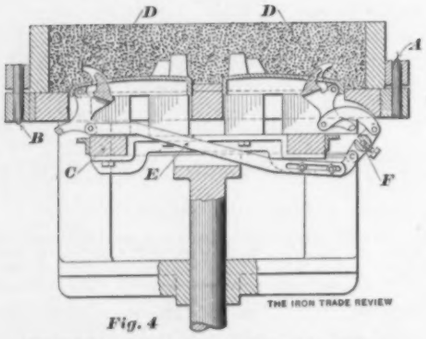


Fig. 4

SECTIONAL VIEWS OF MOLDING MACHINE.

The stripping plate carrying the flask is secured to it by the pin A at one side. This projects upward from the stripping plate and passes through a hole in the rim of the flask. At the other side the parts are held by the pin B extending through another lug. A rectangular frame C is braced underneath by horizontal arms and carries the pattern, the combination resting on a vertical support moving freely in the main frame of the machine to allow the pattern to be raised and lowered through openings in the stripping plate. The pattern is secured to the carrier C by bolts and has two movable hook-shaped parts D turned in opposite directions. The latter gives the desired contour to the mold at these places. The projecting parts D are suitably linked to a bent bar E having a hub at the center embracing the shaft F to which it is firmly secured. The shaft F has stop lugs adjusted with setscrews to limit the rotary movement in either direction. The shaft also has a crank and handle. Upon the crank rests the grooved end of the latch G.

This form of the machine is particularly adapted for making the upper portion of colds for casting interlocking brake-shoes, and especially the peculiar opening in the mold for forming the hooks on the castings. The purpose of the contrivance is toward mold making which in the case mentioned

PRIDMORE MOLDING MACHINE WITH BRODIN ATTACHMENT.

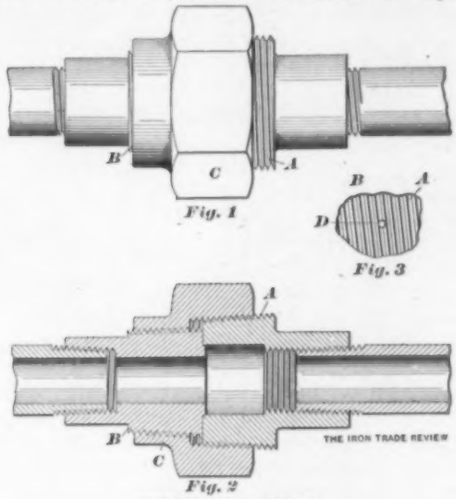
will obviate the necessity of coring, a part of the pattern being first withdrawn, then the pattern as a whole is freely separated from the mold.

The projecting parts D are first set by turning the crank handle until the convex faces of the links rest on the angle irons, the rotation of the main shaft being arrested at this instant by one of the stop lugs contacting with its setscrew. The latch G, the grooved end following the crank, prevents the projecting parts D from being forced back by the impact of the sand in the process of making the mold. When this process is completed, the latch G is lifted and the hand crank turned in the opposite direction, withdrawing the hooks D far enough to allow the pattern to be lowered without injury to the mold. The backward turn is arrested at the proper point by the contact of the other stop lug with its setscrew.

Pipe Coupling.

Joseph C. Phelan of Lynn, Mass., has patented a pipe coupling. Fig. 1 is a side elevation of the coupling, Fig. 2 is a longitudinal section and Fig. 3 is a detail of a por-

tion of the coupling members. The ends of the pipes have tapering threads. Two coupling fittings are screwed tightly on the piping and have tapered portions at A and B. The threads on these tapers are of the same pitch and decrease in depth from the ends of smaller diameter. A coupling ring C is hexagonal on the outside for a wrench. This ring is screw threaded on the inside and tapered in

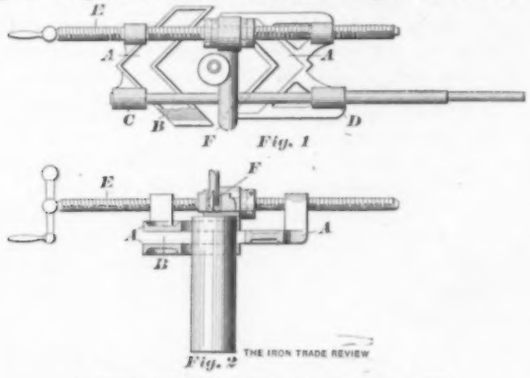


CONNECTING PIPING.

the same direction and having the same pitch as the threads A and B, the threads decreasing in depth accordingly. The tapering threads are cut while the abutting fittings are held on an arbor with the ends pressed closely together. While in this position a hole may be bored radially and a key D inserted to hold them in alignment. The threads on the ends of the piping are either both right hand or both left hand and of the same pitch.

A Centering Jig.

A jig for centering bars, rods, etc., has been designed by Emil A. Christoph of Chicago. Fig. 1 is a plan view of the invention showing the jaws partly opened and a portion of one jaw broken away. Fig. 2 is a sectional view depicting a round bar in the jig. One of the jaws A is slotted at B to receive the other jaw. The jaws have sockets to center round or square stock for drilling as in Fig. 2. A guide rod is fastened in a lug C on one of the

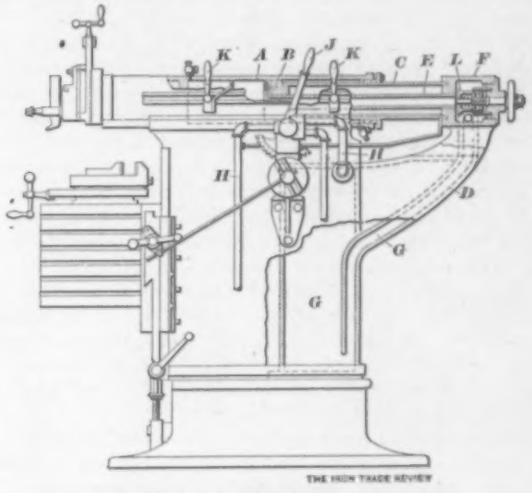


A DRILL JIG FOR ROUND OR SQUARE STOCK.

jaws and it extends through a tubular lug D on the other jaw. A right and left hand threaded rod E works in tapped holes in lugs on the jaws and has an operating handle. An arm F is pivotally held on the middle of the threaded rod. This arm has a bushing for the drill. The inventor shows additional guide rods in modifications of the form seen in the engraving but says that he has found the jig constructed with a single guide rod as shown in Fig. 1 to work very satisfactorily. "In practice, the arm having first been set to bring the drill-guide opening central of the jaws, the work is arranged in place between the jaws and the screw-rod is operated to clamp the jaws thereon. The work clamped in the jig is then arranged on the table of a drilling machine and the drill inserted in the guide-opening."

An Air-Driven Shaper.

The invention devised by John Riddell, mechanical superintendent of the plant of the General Electric Co., at Schenectady, N. Y., relates to metal working machinery and the object is to provide a machine tool with a driving device capable of being operated by compressed air, steam or water under pressure. In tools such as planers, shapers, etc., where the work affords a considerable resistance to the cutting tool, the means for applying the power to it must be rigid in order to avoid sudden shocks when the depth of the cut varies, a condition which obtains when the piece of work has high and low spots. Compressed air has been regarded as an impracticable motive power for such machines, since its elasticity causes it to drive the tool with a yielding pressure that produces a recoil and breaks the tool when the pressure at the cutting edge is suddenly lessened. Nevertheless, the general use in shops of compressed air for operating hoists, chipping tools, hammers, drills, etc., makes the possibility of applying it to other machines most desirable. Mr. Riddell changed over one of the old shapers in his shop before applying for his patent. He employed compressed air for the motive power



SHAPER WITH COMPRESSED-AIR DRIVE.

and the machine has given very good results. Steam or hydraulic power also can be employed with this device.

The illustration shows a side elevation of a shaper equipped with the invention. It will be seen that the cutting tool is actuated by a cylinder and piston, Mr. Riddell preferring the former as the movable element of the pair. The rear end of the tool carrier or ram is a horizontal cylinder A with a piston B, provided with water-tight packing and supported in a fixed position by tubular piston rod C. This is fastened at one end to the piston and at the other to the arm D projecting to the rear from the pedestal of the machine. The rear end of the cylinder has a packed joint around the tube C. The upper end of the arm has a hollow head F from which a tube E runs through C and the piston B. The chamber in the head F communicates with a passage way and a reservoir G. This reservoir is filled with an incompressible liquid such as water or oil. An air pipe H leads from some source of compressed air and enters the upper end of the reservoir. The air supply pipe has a three-way cock to admit the air to the reservoir or exhaust it therefrom through an escape pipe. The three-way cock has handle J by which the cylinder can be started, stopped, or reversed at will. In order to render the movements of the tool carrier automatic, two tappets are clamped by screws with adjusting handles K and these are clamped

strike the handle J at each end of the stroke of the tool. By adjusting the space between tappets the stroke can be made of any desired length within the range of the machine.

The speed of the tool can be regulated by a valve in the water conduit. This may be accomplished by a throttle valve L in the hollow head F, arranged to shut against the rear end of the tube E. The valve is constructed as follows: A screw-threaded spindle engages with the valve and has an operating-handle outside the head F. In order to allow the valve to open wide when the carrier makes its back stroke, and thus offer no obstruction to the return of the water to the reservoir, the valve slides freely on the spindle and on two studs fixed in the rear wall of the chamber, while the spindle meshes with a nut, splined inside the tubular body of the valve. A helical spring abuts between the head of the valve and this nut. When the spindle is turned, the nut rides along in the valve-body until it abuts against the back end further turning of the spindle withdraws the valve from its seat and permits the water to enter the cylinder A and produce the cutting stroke. On the return stroke the water forces the valve back against the tension of the spring, giving a wide opening for its escape. The cutting stroke is effected by the pressure of the water on the front head of the cylinder, the stationary piston serving as an abutment. The return stroke is effected by the air pressure admitted constantly to the space between the cylinder and the tube C through a small pipe leading from the supply-pipe H through the tube C and opening into the space just back of the piston.

The operation is as follows: When the operator throws the handle J over to the position shown in the illustration, the air is admitted to the reservoir G and forces the liquid through the passage-way and the tube E into the cylinder A with a speed depending on the adjustment of the valve The area of the front head of the cylinder is so much greater than the surface of the rear head exposed to the air-pressure at the rear end of the space that the cylinder moves to the left, making a cutting stroke. When the tappet reverses the position of the handle J, the air exhausts from the reservoir and the air-pressure drives the cylinder backward to the right, the valve in F opening wide to let the liquid flow back freely to the reservoir. At the end of the back stroke the tappet again shifts the handle, and the operation is repeated.

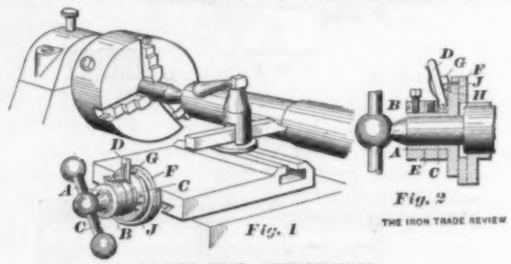
In order to economize air when the tool is making short cuts with the tool-carrier working near the limit of its outstroke, Mr. Riddell has provided an adjustable front end for the cylinder. This is not illustrated as its function is evident and the construction simply an adjustable extension of a false head to the piston. Mr. Riddell has a number of other ingenious modifications of the scheme shown.

Lathe Improvement.

T. P. Keating of Schenectady, N. Y., has taken out a couple of patents on improvements of the lathe. Both may be applied to other machine tools but are here illustrated as used on engine lathes for metal working. The first of these inventions "has for its object the provision of an inexpensive and readily-applied attachment adapted to arrest the movements of a feed-screw in certain predetermined positions, so that the cutting-tool will be accurately positioned to turn to exact dimensions of shafts or other pieces having a number of different diameters and without the necessity of calipering the respective diameters."

Fig. 1 is a perspective view of a part of an engine lathe with an attachment for limiting the movement of the cross-feed screw. Fig. 2 is a vertical axial section of the attachment. On the outer end of the feed-screw between the crank and the face of the carriage is a sleeve A with an index flange at the outer end. The rear end of the sleeve is slotted in order that it may be sprung into clamping engagement with the screw. Around the rear end of the sleeve is a collar carrying a setscrew to force the split end of the sleeve into contact with the screw. Just back of the index flange is a collar C loosely fitting the sleeve A and having a radial arm D pivoted to it. Between the collars B and C is a third collar E which is fixed on the sleeve by setscrews so as to exert the required degree of friction on the collar C. A stationary plate F with a stop projection, encircles the feed-screw and is fastened by countersunk screws to the tool carriage.

The pivoted arm D is pressed forward by a spring and has projections G and H on the forward edge. The projection G engages the stop and the projection H enters any one of the series of holes J near the periphery of the

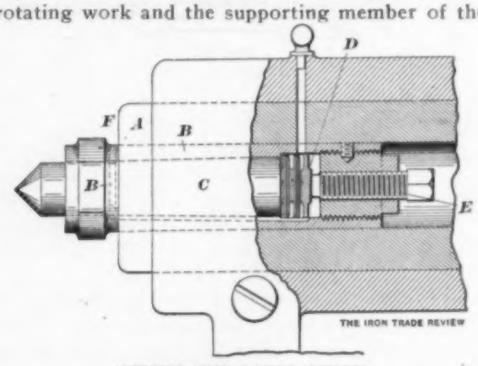


LATHE TOOL ADJUSTMENT.

index flange. The holes in the index flange are spaced according to the pitch of the feed-screw and are arranged so as to determine the extent of the movement in changing from one diameter of work to another.

In operation, the tool is fastened in the post in the usual manner and the first diameter is turned to size by calipering. Then the setscrew is loosened for the adjustment of the sleeve A to bring the index flange with the radial arm D in engagement with the first hole J and the projection G against the stop. The sleeve is then fixed in position and the arm D disengaged from the first hole J. The feed-screw is then turned to bring the projection G against the stop. The tool is now set to cut the next diameter and after this operation the arm is again moved to engage the next hole in the index plate and the feed-screw turned to the next stop.

Mr. Keating is also the inventor of a lathe center applicable to machines for turning heavy shafting. It is also designed for high speed work as in polishing lathes. The invention consists in a tailstock center comprising two concentric members, the inner one being rotatable in the outer shell. The design is such that a certain degree of friction can be maintained between the two members slightly in excess of that which ordinarily exists between the rotating work and the supporting member of the cen-



FREEING THE LATHE CENTER.

ter. Under ordinary conditions this part will remain stationary, but if for any reason the friction between the work and the center becomes excessive the latter can rotate and thus obviate all danger of its breaking off.

The illustration shows a longitudinal section through the tailstock of a lathe and shows the working parts of the invention. The tailstock is provided with the usual

spindle A having a tapering socket for the outer member B of the center. This tapers to fit the spindle and has a projection with facets fitting a wrench when it is necessary to remove it. The sleeve B has the small end of the taper at the outer end. The rotating part C fits into the tapered sleeve B and has a conical tip to support the work in the lathe. The inner member C is not so long as the outer part B, and in the space beyond the larger end there are several antifriction discs D held in place by a pressure screw E working in a threaded bushing inserted in the inner end of the sleeve B and fastened by a setscrew. The discs D are spaced by central hubs and the edges are thinned to a narrow edge to reduce the friction between them and the wall of the chamber where they are enclosed. Mr. Keating advises the making of the discs alternately of bronze and steel. An oil hole at F is in the projecting end of B, this communicates with an annular groove around the outer end of C. A channel runs from the groove along the under side of the rotatable member C and communicates with the chamber containing the discs D.

The pressure-screw E is tightened up until the friction between C and B is slightly greater than the normal friction between the rotating work and the center. So long as these conditions exist the center will remain stationary; but in case the friction on the tip becomes so great that there is danger of the center being twisted off the inner member will rotate with the work.

Car Wheel Manufacture.

A method of manufacturing castings (as it is designated by the patent papers) has been devised by Jacob K. Griffith of Latrobe, Pa. Fig. 1 shows in vertical section a mold with its contained casting, illustrating the application of the invention in the casting of one form of car wheels. Fig. 2 is a similar view on a larger scale with lines indicating in diagram the progressive chilling of the metal. The inventor avers as follows: "In the manufacture of cast-steel car wheels, wheel blanks from which car wheels can be rolled, and like cast-steel articles having a hub and rim and an intermediate diaphragm thinner than the hub and rim, great trouble has been experienced by reason of the shrinkage cavities which heretofore have formed in the metal generally a short distance within the periphery of the wheel, so that as the wheel wears down the shrinkage cavities are eventually exposed and the wheel then rendered useless. The presence of such cavities is also an element of danger, because they form lines of weakness on which the wheels are liable to break. Casting with sink heads has been employed to prevent these difficulties as far as possible; but such mode of casting is unsatisfactory and is a source of expense and difficulty. I have discovered a means of making such steel castings with little or no shrinkage cavities or with shrinkage cavities so displaced in position as to be harmless without need of employing sink heads or like devices. This renders it possible to make car wheels with much less expense than has been possible heretofore and to secure a better product."

Just how Mr. Griffith proceeds about this work is outlined in the engravings. The runner has at A a head box through which the molten metal is supplied to the casting. The drag has an outer chill B which comes in contact with the bottom face of the casting at its periphery. A central chill C is in contact with the outside of the hub of the wheel and D is the sand against the intermediate or web portion of the wheel. The cheek piece at E also is a chill for the periphery of the wheel. The cope has an outer chill at F, an inner chill J for the top of the hub and a non-conducting material, such as sand, for the top of the web. At H is the center core or hub core. Instead of casting the wheel by bottom casting from a central runner, as illustrated in the drawings, which permits the molder to cast several molds at the one operation, he may cast from the top by pouring from a head box, etc. The gate at which the metal enters the wheel cavity will be placed near the center of the hub but where the core is of small diameter the gate can be formed at the end of the hub. Mr. Griffith fills his mold as quickly as possible and in casting a 33-in. car wheel claims he fills the mold in about thirty seconds. The mold thus filled chills substantially as depicted by the dotted lines in Fig. 2. The inventor finds that the steel in contact with the chills solidifies at the rate of about ½ in. per minute but in contact with the sand it cools much more slowly.

The chills at the ends and periphery of the rim of the wheel and at the ends of the hub cause these to solidify very quickly. The web and the inner sides of the hub being in contact with the sand cool slowly and when the wheel has set to the innermost dotted line in Fig. 2 there are still liquid portions K extending into the web and the shrinkage cavities will be found in these last-cooling por-

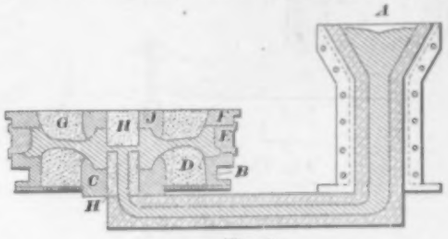


Fig. 1

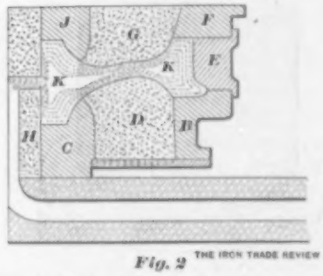


Fig. 2

THE CASTING OF CAR WHEELS.

tions. "The rapid contracting of the rim, however, acts upon these relatively small interior bodies of molten metal and subjects them to a strong compression exerted inwardly in the plane of the web, so that at the time when the metal at the gate is solidified sufficiently to cut off the entrance of further molten metal to the casting this strong inward pressure of contraction due to the natural cooling of the metal in the rim will act on the still-molten interior portions and will compress the same, so as to eliminate or greatly reduce the shrinkage cavities. The chilling and setting of the metal at the outer sides of the hub offers resistance to the inward contraction of the rim. The chills acting on the three sides of the rim chill it uniformly, whereas if the chill were applied to the end and to one of the other two sides only it would be ununiformly chilled."

The distance between the chill surfaces at the hub of the wheel is greater than the thickness of the web between the hub and rim. The interior of the hub and web remains fluid until the rim has solidified and the molten metal has free access to the web from the gate. The inventor has found in practice that when the gate is of ordinary size the metal at that gate will solidify in about five minutes, at which time the admission of fluid metal to the casting

will cease; but the cooling of the casting has then so far progressed that the interior unsolidified portions are small in volume, as indicated in the drawings, and an efficient compression will take place. When the casting has sufficiently cooled to enable it to be removed (say in about ten minutes after casting a car wheel of ordinary size), he removes it from the mold. It will then have contracted in diameter about one-eighth of an inch out of a total ultimate contraction of thirteen-sixteenths of an inch in a thirty-three-inch wheel. The casting is then embedded in ashes to cause it to cool more uniformly and slowly than if it were in the open air or were allowed to remain in the mold in contact with the chills. The body of sand which adheres to some extent to the web after the wheel is removed will afford a natural device for retarding the cooling of the web in the manner desired.

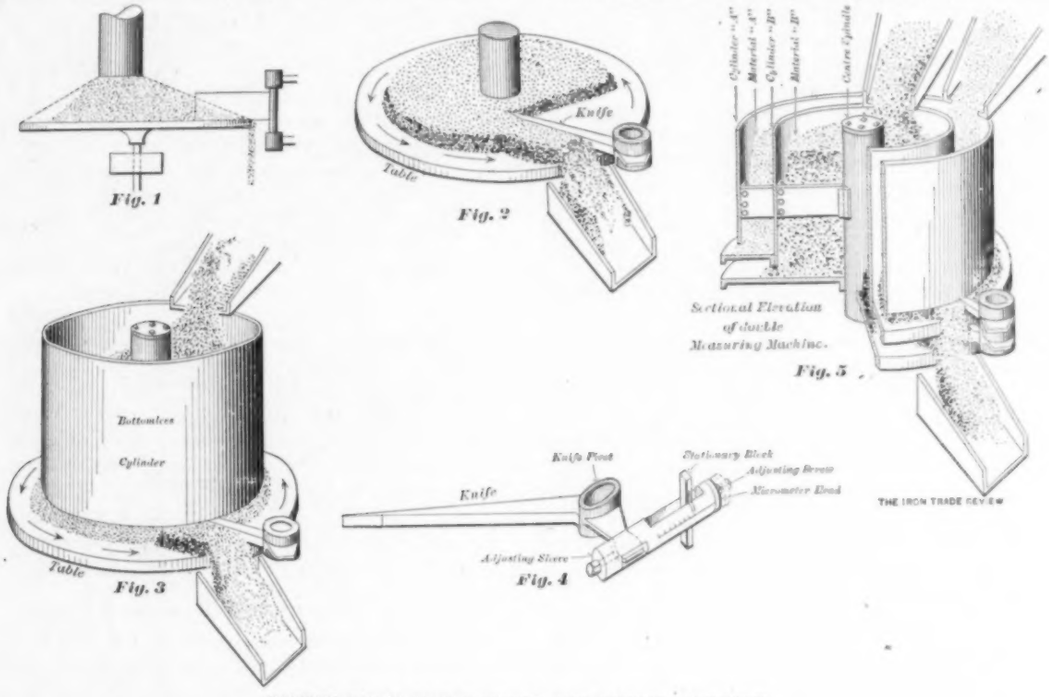
The Pennsylvania Railroad Co. by recent action of its board of directors has authorized the expenditure of $600,000 for a new erecting shop at Altoona, Pa., to be known as No. 3. It will require about 1,000 tons of structural steel. The main building will be 90 ft. wide by 400 ft. long and in addition there will be built an extension to the power plant in which will be installed six 450 h. p. water tube boilers to carry 150 lb. pressure. The erecting shop will be equipped with two 65-ton electric traveling cranes, six 2-ton electric traveling jib cranes and some smaller tools for which quotations are being asked. The completion of this shop will be hurried to the utmost and it is expected that the work will be completed in three months. Along with the inquiries for requirements for these new buildings are being made inquiries for a list of tools for the United Railroads of New Jersey Division, this division being the last of several to make provision for its 1905 requirements.

The Stamford Foundry Co., Stamford, Conn., manufacturer of stoves, ranges and furnaces, expects to add largely to its plant to meet the needs of its growing business resulting from its close affiliation with the Stamford Gas Stove Co. Some new machinery will be installed, orders for part of which have been placed.

MEASURING AND MIXING CRUSHED MATERIALS*

BY E. N. TRUMP, SYRACUSE, N. Y.

The developing of chemical processes has been an enlargement of the chemist's methods, and we find the favorite plan the "batch method." The material is measured or weighed in convenient sized "batches" and brought together in some kind of a mixing machine to be mechanically thrust or tumbled about until the particles are supposed to find their proportional distance from each other. The smaller the batches are made the less time required for the mixture, but the multiplying of the operations becomes a very monotonous occupation for the men entrusted with the weighing or measuring, soon resulting in careless work and requiring constant checking and testing to keep up the standard of quality. The use of hopper scales, or of automatic scales, has improved the proportions, but the materials are still delivered in batches of considerable size, and must be thoroughly mixed by an intermittent process corresponding in time with the weighing, and difficult to make automatic. Even when the mixture of a batch is good it is often difficult to discharge the product from the mixing machine without destroying the accuracy of the mix because a difference in the sizes of the particles, or a difference in their specific gravity, tends to re-distribute the ingredients in the receiving hopper, which must be large enough to hold the contents of the mixer. Weighing machines are affected by the varying condition of the materials, which stick to the hoppers, or the dust which clogs the delicate balances. The gates used to feed the weighing hopper, or discharge its contents, leak, and foreign substances clog or prevent their proper action. Where the material contains varying amounts of moisture frequent tests must be made and the weights changed to obtain the proper portion of dry material. The measuring of batches of material is subject to the variations in the personal equation of the attendant. The height of fall into the measure, the temperature and condition of material, the method of striking off surplus, the amount of tamping the material receives, all affect the result.



VARIOUS FORMS OF MEASURING AND MIXING MACHINES.

Many machines have been made, and are in use, to proportion materials and mix them continuously. It is recog-

*From a paper presented at the Scranton meeting (June, 1905,) of the American Society of Mechanical Engineers.

nized that much saving of labor in handling, and greatly enlarged outputs, will result from proper methods.

The first element of continuous mixing is a continuous feed, which will be rapid and accurate, and not affected by varying conditions of the materials, or at least adjustable to these conditions. The following methods may be mentioned:

Screw conveyors are used for discharging a stream from a hopper, the quantity being regulated by a sliding gate at the end or by changes in speed.

Shaking spouts operated under a hopper to move the material delivered upon it.

Revolving pockets receiving material from a spout and emptying into a spout below.

Revolving rolls arranged to feed a measured quantity by the distance between them, or from a spout by extending the natural slope.

Reciprocating tables moving horizontally under a spout, and moving the material out over its edge.

Revolving tables with stationary spout grinding material out until it falls over its edge, or is diverted by an inclined blade.

The revolving table, with a stationary spout above its center, has been considered the most accurate, and is much used in cement manufacture for feeding mills, etc. Its defect is the change in the natural slope of the material, which varies the amount cut off by the diverting blade as indicated by dotted lines in Fig. 1. If we make the table of relatively large size and distribute the material in a uniform layer upon it, as

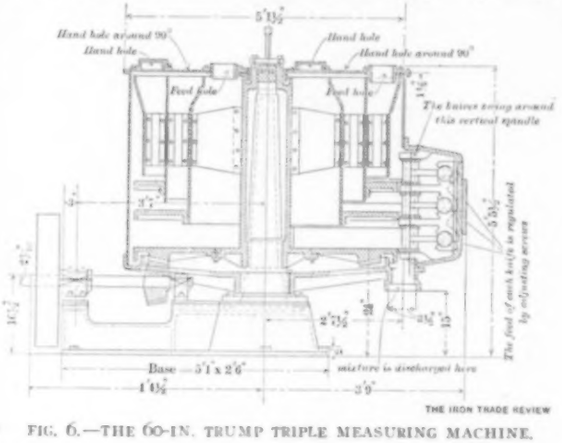


FIG. 6.—THE 60-IN. TRUMP TRIPLE MEASURING MACHINE.

shown in Fig. 2, the stationary knife, or diverting blade, may be pivoted so as to take off a predetermined quantity in one revolution, and if the layer is thin, variations in the natural slope on the edge will affect the accuracy very little. As the table revolves the stationary knife will divert the material in front of it over the edge of the table and it will fall in a continuous stream into the chute. If the material is replenished on the table so that the layer taken off by the knife is restored to exactly the same shape as before, and is continuously removed by the knife, an accurately measured quantity will be diverted.

By adding to the table a bottomless storage cylinder, somewhat smaller in diameter, with its lower edge spaced a distance above the table sufficient to clear the knife and yet near enough to the table so that the material flows out from under the edge of the cylinder and takes its natural slope, we shall have the condition represented by Fig. 3.

The cylinder being supported by arms from the central spindle may be filled to the top by means of the chute, and as the knife removes the section represented by its path over the table, the material from the cylinder above will take the place left vacant, and will come out under the edge of the cylinder to the extent of its natural slope. While the slope may vary a little this variation is a very small part of the amount diverted by the knife, and as the material composing nearly the whole base of the cylinder is cut away the space behind the knife is filled from above with nearly uniform pressure, and in practice the natural slope angle is almost exactly the same, in spite of considerable differences in height of material within the cylinder.

After deciding on the distance between the bottom of the cylinder and the table, and the width of the knife, the other factors, which determine the amount of material measured off in a given time, are the speed of rotation and the depth of the cut of the knife, and these are both adjustable. The depth of cut of the knife is adjusted by swinging the knife around on its pivot so that it extends a greater or less distance into the material. This swing is controlled by a screw attached to an arm, cast as part of the knife, and a micrometer scale with pointer shows the amount of movement. This is shown in Fig. 4.

The mechanism described may be employed for the feeding of a great variety of materials, varying considerably in size and consistency, and if the size of the table, the shape of the cylinder, and the size of the knife and space between the cylinder and the table are properly adjusted, almost any kind of crushed material may be fed.

The variations in size may extend from fine powders, like cement, to rocks of 6 in. cube. In the case of the larger sizes the space between the bottom of the cylinder and the table is made considerably higher than the height of the knife, as the space between the bottom of the cylinder and the top of the knife must be sufficient to let the largest pieces pass through without catching. The amount diverted by the knife is not dependent upon its height, but on the height of the space under the cylinder.

FIG. 7.—CONCRETE MIXER AND MEASURER OF SEMI-PORTABLE TYPE.

As an example, in the case of a table 12 ft. in diameter, feeding rocks of 6 in. cube, the variations for a single revolution, where some 6,000 lb. were diverted, showed less than 2.5 percent, and for 10 revolutions the variations were less than ½ of 1 percent of the quantities. With finely powdered materials the variations in the quantities by volume are considerably less than this.

A measuring table of 3 ft. 6 in. diameter is being used as a meter measuring the quantity of powdered material delivered to a series of furnaces. The quantity was formerly ascertained by passing the material through a hopper scale, where batches were continuously weighed by an attendant. The measuring table was calibrated in different positions of the knife, and the total quantity measured by it was checked for two consecutive months. The variations from day to day, where 12 to 15 tons of material were measured, were less than 50 lb., and the total differences for a month, for a measurement of 400 tons, showed in one case 108 lb., and in the other case 150 lb. As these variations were both sides of the average, the results of the scales were as doubtful as those of the measuring machine. The same machine filled to the top of the cylinder was revolved and the material for each revolution weighed separately, the depth of the cylinder being about 3 ft., the quantities for each revolution were within 1-10 lb. of each other, on a weight of 5 lb., and no variation occurred until the material reached within 6 in. of the bottom

of the cylinder, when it began to decrease a little in quantity for each revolution.

Having now obtained a method of measuring the materials, the proportioning of two or more materials, and the subsequent mixing, becomes a matter of the combination of two or more cylinders. Two measuring machines, such as have been described, may deliver into the same spout, and may be driven at different speeds, or the same speed, and by adjusting the knives any proportions may be secured. As the function of a perfect mixer is to deliver the materials in the proper proportions in as close contact as possible, it is important to bring them together in superposed sheets while falling from the table, so that little subsequent mixing will be required. To reduce the amount of mechanism, therefore, and have only one revolving part, the arrangement shown in Fig. 5 is adopted.

The two or more tables are set one above another, and the cylinders supported from the same spindle, so that they all revolve together. Each table has its own storage cylinder, or annular space between the cylinders, and for each table there is a knife with its own adjusting mechanism. These knives may be adjusted at will to vary the percentages of material in a mixture, and when the proportions are approximately known, the width of the knives and the distance between the cylinders and the tables are fixed at approximately the average desired. As the material is diverted over the edge of the upper table it falls into the material coming from the knife next below, and these two quantities fall into the material from the third table, and so on, in case three or more tables are used.

The design of this measuring machine may be considerably modified for different uses. One form of the machine is shown in Fig. 6 in which three tables are used, the tables and storage cylinders being all mounted and driven by the same center sleeve, which is carried on a dirt-proof step-bearing on top of a stationary spindle. The lowest table has a bevel gear on the under side, which is driven by a pinion mounted on a countershaft. A ring projecting down from the outer edge of this table runs in a dust seal in the bottom casting. The casings of the machine are made dust-proof, to avoid any possibility of leakage, and the whole is mounted on a substantial base. The three knives can be readily adjusted by the micrometer adjusting screws shown on the right, and a closed delivery chute and receiving chutes may be readily connected to the cover and delivery spout.

Figs. 7 and 8 show an arrangement of measuring machines, adapted to concrete mixing, which has been very successful. Fig. 7 is intended for a semi-portable machine, having a capacity of 50 cubic yards of concrete per hour, the materials being fed from temporary stationary hoppers supplied with ordinary elevating mechanisms, and delivered by the measuring machine through a double spray of water into a short interrupted screw, so that the concrete is delivered in a continuous stream accurately proportioned and thoroughly incorporated with the water. With this machine about 10 horsepower is required for measuring and mixing at the rate of 50 cubic yards per hour, and as small a quantity as a cubic foot can be made with the same accuracy as a much larger quantity.

The diverting knives of the measuring machine can be quickly changed to suit the proportions required in the concrete, and are provided with a locking arrangement so that they can be set by the superintendent and not changed except by his direction.

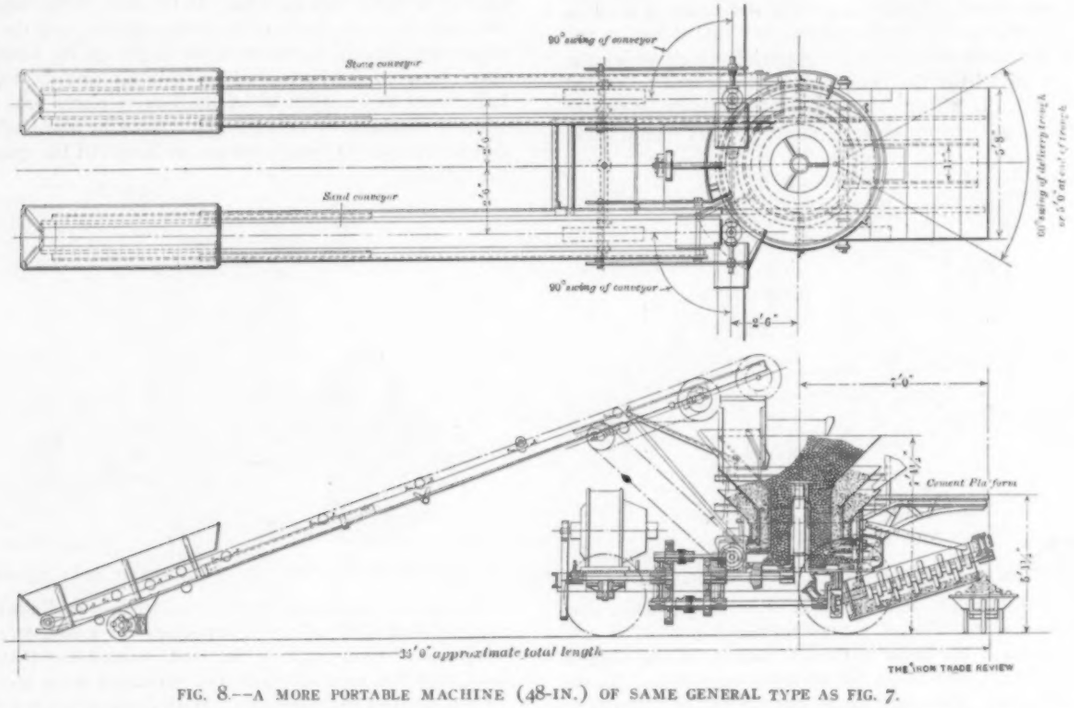


FIG. 8.—A MORE PORTABLE MACHINE (48-IN.) OF SAME GENERAL TYPE AS FIG. 7.

Fig. 8 shows a more portable arrangement of the same style of machine, designed to have a capacity of about 30 cubic yards per hour, in which special belt conveyors are provided for receiving the sand and stone at the level of the ground on each side of the machine, the cement being delivered to a platform and fed into the machine from bags by an attendant. These machines may be driven by a motor or engine and boiler, and the interrupted screw mixer has vertical and horizontal movements, which are useful in delivering to wheelbarrows, into excavations, or onto the street level in street paving work. The great saving effected by the accuracy and continuity maintained by these machines have been proven in actual practice, and the accuracy demonstrated by use in actual construction. The only limit in speed is the ability to get material into them fast enough, and as only the interrupted screw conveyor contains any mixed concrete no cleaning is required, and the machine can be stopped and started with little delay.

In conclusion, it seems proper to state that the principles and details used in the measuring and mixing machines described have been made the subject of patents in this country and abroad.

VETERAN ENGINEER

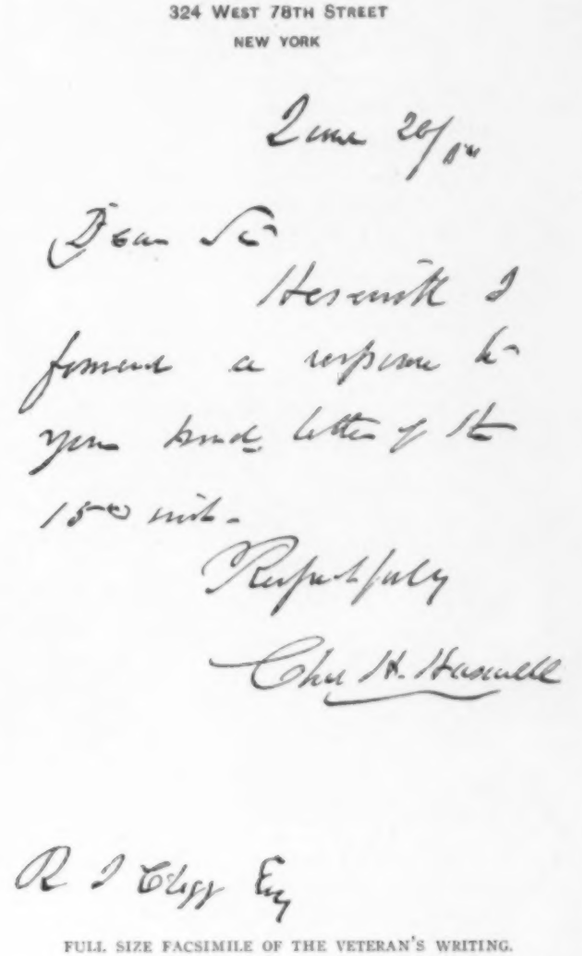
Receives a New Honor in his 96th Year.—Life of Chas. H. Haswell.

The announcement at the June meeting of the American Society of Mechanical Engineers that Charles H. Haswell had been elected an honorary member of the society was received with hearty applause. He forms a link between Fulton and Melville and possesses a robust personality that indicates excellent prospects for his complete enjoyment of the Fulton centennial celebration in the near future. He is a resident of New York, where he was born ninety-six years ago. He received an academic training and at nineteen was employed in the engine shop of James P. Allaire, of New York. In 1836 he entered the United States Navy as chief engineer and was

CHARLES H. HASWELL.

commissioned Engineer-in-Chief in 1843. During his naval service he designed and built the first steam launch, the *Sweetheart*, in 1837, and also designed the machinery for ten war ships. He retired from the navy in 1851 and then built several merchant steamers and designed and built various important engineering structures. He was the first to apply zinc in a steam boiler, in 1847, and later used it in the hold of a vessel to arrest the corrosive action of salt water. This was long before its trial elsewhere as a new invention. Mr. Haswell had acquired a national reputation by this time and in 1853 by way of acknowledgement of some professional service he received a diamond ring from the Emperor Nicholas of Russia.

When the Engineer Corps of the Navy was organized by Congress, a man from civil life was appointed to the position of Engineer-in-Chief. The *Missouri* was soon after ordered home for the purpose of testing a novel design of horizontal smokestack. Mr. Haswell found it impossible to endorse the scheme as practicable and being further of the opinion that two pipes of 3½ ft. in diameter were not of the same capacity as one pipe of 7 ft., he was held to be guilty of disrespect to his superior officer and was suspended from duty. Further investigation demonstrated the accuracy of Mr. Haswell's contention and he was informed that if he would apologize for his "insubordination" he would be restored to duty. This by no means met his views and he replied, "I prefer to submit to injustice from others rather than do it to myself. I decline to give an apology as I owe none." He was detached accordingly from the *Missouri* and set to work on the design and construction of four revenue cutters and then a steam sloop at Pittsburg. The Engineer-in-Chief was soon officially ignored and Mr. Haswell discharged his duties and in 1845



FULL SIZE FACSIMILE OF THE VETERAN'S WRITING.

was promoted. He held the position to 1851 when President Fillmore supplanted him with a civilian, but restored to him his rank as Senior-Chief-Engineer.

The well known *Powhattan* was one of four steam frigates designed in 1848 by a board of which Mr. Haswell was a member. He designed the entire engine and boiler equipment of the *Powhattan*. This task is the more remarkable owing to the great difficulties under which the work was satisfactorily accomplished. He lacked professional and clerical aid, was under urgent pressure from the naval authorities and the contractors and he proceeded without a general design to perfect and carry out the design in detail. He made the working drawings with his own hands in the intervals between periods requiring attention to the duties of his office as Engineer-in-Chief of the Navy. The attempt was unprecedented in so important an enterprise and to carry it

into a perfected form indicates the engineering aptitude and skill brought to bear on the problem.

Mr. Haswell was ordered to the Mediterranean in 1850 though in indifferent health and despite the condemnation of a board of surgeons. He proceeded to the Mediterranean but soon returned home as "unfit for active service from ill health."

From 1851 to 1893 he held the position of surveyor of steamers for the marine underwriters of New York, Boston and Philadelphia. He designed and located the structures on Hoffman Island in New York harbor, the crib bulkhead at Hart's Island, the foundation of several of the large buildings in New York. He has supervised testing of the water works capacity at New Bedford and Chicago. He is at the present time consulting engineer for the Board of Public Improvements of New York. In this capacity he directed the extensive improvements at Riker's Island.

He is the author of a well known pocket book for engineers, a work which has passed through many editions since 1846. He is the author of a text book on mensuration, one on bookkeeping and a volume entitled "Reminiscences of an Octogenarian of New York City, 1816 to 1860."

A full size facsimile of his handwriting is here reproduced. It was sent with notes from which this biographical sketch has been prepared. The neat handwriting on the one side of the page and the trim alert figure on the other must be disconcerting to any believer in Oslerism. The good wishes of the engineering fraternity will be cordially proffered to this sturdy American who at 96 years young is the latest recruit to the list of honorary members of the American Society of Mechanical Engineers.

The Invention of Grooved Rolls.

The *Iron and Coal Trades Review* publishes the following letter:

Whilst abroad in March I observed a statement in the *Times* that a monument of Henry Cort has been raised with an inscription which added to his well-known claim to be the inventor of puddling that of being the inventor of grooved rolls. The inclosed abstract from a very interesting paper, entitled "How to Beat the Dutch without Fighting," by Sir William H. Bailey, of Manchester, on two volumes by Andrew Yarranton, written in the year 1676, entitled "England's Improvement by Sea and Land. To out-do the Dutch without Fighting; to Pay Debts without Moneys," reads as follows:

"He (Yarranton) says: 'I have noticed the way in which rings and bolts are made for ships, and we ought to imitate in this country what they do in Germany, for I have seen bars of iron made perfectly round, about 12 ft. in length and 1 in. diameter, and they are sent down the river to Holland, where they are employed for making bolts and rings. They are uniform in size, and are much better for use in shipping than those which are made with the hammer.' It appears these were made with an engine truly made for the purpose, and he suggested that such a machine should be introduced into this country. That is a common rolling mill, and it shows how far we were behind in iron manufacture in his time when that was an unknown tool in this country."

It would be interesting to know if any of your readers can throw further light on this subject, as it is clear that bars 12 ft. long and 1 in. diameter, perfectly round, could not have been made or rolled other than in grooved rolls.

FRED MILLS.

Ebbw Vale, May 22, 1905.

James M. Swank in the *Bulletin* of the American Iron and Steel Association comments on the letter as follows:

"In chapter 8 of *Iron in All Ages* will be found much interesting information concerning the use of the rolling mill prior to Cort's time. Cort's great invention was the puddling furnace, not the rolling mill, but he is entitled to the credit of having improved and enlarged the uses of the latter."

FLED FROM FLAMES.

How "Kaiser Wilhelm der Grosse" was Saved by Quick Work of Tugs.

The promptness with which a turbine can be put into action was the subject of a paper read at the June meeting of the American Society of Mechanical Engineers. During the discussion mention was made of the celerity exhibited in taking the steamship Kaiser Wilhelm der Grosse from her moorings at the Hoboken, N. J., pier of the North German Lloyd Steamship Co. at the time of the great fire on June 30, 1900. Further facts have been obtained from the North German Lloyd Steamship Co.'s superintendent at the Bremen piers. The communication throws some light on the occurrences of a strenuous day for the engineers and others most concerned with the safety of this huge vessel and the record is here given space as follows:

"The supposition, that the Kaiser Wilhelm der Grosse was taken from the pier by her own steam power is not in accordance with the real facts in this case. When the fire broke out (about 3:40 p. m. on Saturday, June 30, 1900), the steamer had no steam up excepting on one boiler, which furnished only sufficient steam for the deck winches, pumps, dynamos for the electrical plant, etc. All the other boilers were being cleaned and put in shape again for the next trip. The engines were partly disjointed and several cylinders had their covers removed. This cleaning and overhauling is done every time when the steamer is in port.

"That we were able to get the steamer clear away from the fire, which spread with such formidable rapidity, was due in the first place to the lucky circumstance, that we were about to shift the steamer close to her pier. The steamer had just finished taking aboard the coal needed for her return trip to Bremen. The coal boats, which had been lying on each side of the steamer, were being removed. The steamer was about 35 ft. off the pier and was being hauled close to the pier. She was, therefore, in motion when the fire broke out, which was of the greatest assistance in pulling her out, as the deck winches were using every pound of steam to pull on the hawsers, which had been carried to the end of the pier.

"Immediately after the fire broke out a number of tugboats steamed up to render assistance and I ordered the first ones to pull out the Kaiser Wilhelm der Grosse, she being the most valuable of the four steamers, lying at our piers at the time. The tugboats succeeded in pulling the steamer out of the burning slips to a safe anchorage with comparatively little damage to the big vessel.

"As soon as the steamer was out of reach of the fire our engineers worked hard as they could to put the engines in shape again and to get steam up. As a rule it takes about 11 hours to get up sufficient steam to drive the propellers, but in this case every effort was made to get steam up as quickly as possible. This was done, to the best of my recollection, in about 7½ hours and it was about 11:30 p. m. that night, when the steamer was able to use her own propellers and was, therefore, independent of outside assistance, although at that time she was riding safely at anchor."

The Brooklyn Heights Railroad Co. has closed contracts with the Westinghouse Companies for two steam turbine electric generating units for extending the present power equipment of the Brooklyn Rapid Transit system. The machines will be the largest power machines in the world, the contracts calling for a normal capacity of 10,000 brake horsepower. and a guaranteed overload of 50 percent, which means a maximum guaranteed capacity of about 16,000 horsepower. The turbines will be of the Parsons horizontal type—the type of the largest turbines at present in operation in Europe and of the 8,000 horsepower Westinghouse turbines recently installed in the power plants of the Interborough Rapid Transit Co. in Manhattan and of the Long Island Railroad in Long Island City.

NEW PLANT OF THE MEYERSDALE SHEET STEEL CO.

The Meyersdale Sheet Steel Co. recently completed and placed in operation a two-mill plant for the manufacture of iron and steel sheets, at Meyersdale, Pa. The plant is located on the B. & O. R. R., between Connellsville, Pa., and Cumberland, Md., about 110 miles from Pittsburg.

The most interesting feature of this plant's equipment is its continuous annealing furnace by which the sheets are uniformly annealed throughout at the rate of about 600 an hour, the work being more rapidly accomplished and the results much better than can be obtained in most of the annealing furnaces now in use. Two little attention is given in many sheet mills to the proper annealing of the product, the oven usually being a crude brick affair into which the sheets are shoved, piled on a buggy, in packs and covered with an annealing box. The packs are rarely uniformly annealed by this method and in addition it sometimes requires several days for them to cool off, after the heat has been withdrawn from the oven or the packs withdrawn in their heated condition, a practice which is now being carried on to some extent.

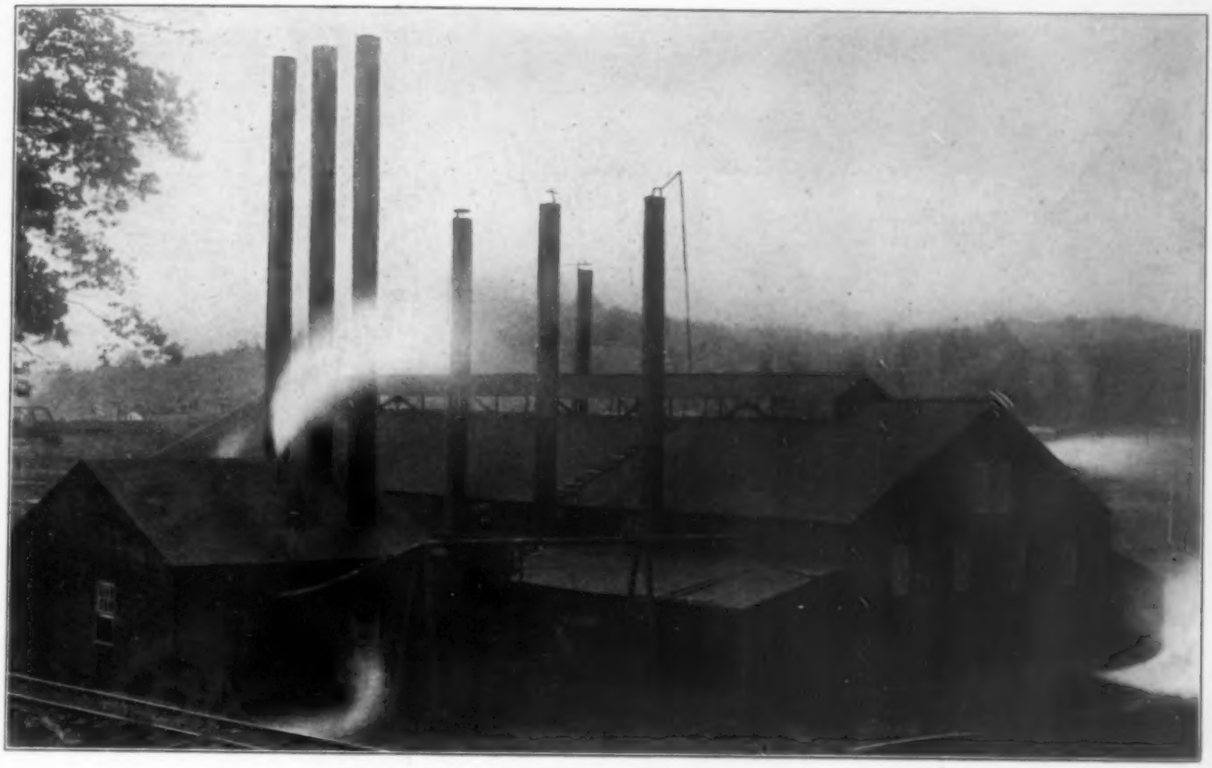


FIG. 1.—THE PLANT OF THE MEYERSDALE SHEET STEEL CO.

This continuous furnace is 40 ft. long and 6 ft. wide and about 3 ft. high in the clear. The furnace contains seven pairs of conveying rolls driven by a chain and sprocket system, the top rails riding idle. The sheets are fed into one set of these rolls at the one end of the furnace, singly, and are carried from one set of rolls to another by means of fixed guides, until they pass out through the other end and are piled in packs and allowed to cool slowly. The rolls are cooled by a system of hollow shafts through which water flows continuously. For properly annealing the different gauges, the speed of the rolls can be regulated and this object can also be accomplished by regulating the coke fire which heats the furnace. The sheets pass directly over the bed of coke and the heat is greatest at the front of the furnace where the sheets are withdrawn.

The plant contains two stands of 24-in. hot rolls and one stand of cold rolls, and is so constructed that additional mills and equipment can be added from time to time with very little change in the actual working conditions of the plant. The main building is of steel construction, 55 ft. wide and 160 ft. long with a 25-ft. leanto on each side.

The location of the plant is admirable for manufacturing purposes, as fuel can be had at very low rates and the shipments of the finished product are made based on Cumberland, Md., as a basis, and as Cumberland has exceptionally good rates to many points east and west, this mill will enjoy all the benefits of being located in a producing center. It was built under the supervision of T. J. Costello, formerly general superintendent of the N. & G. Taylor Co. plant at Cumberland, Md. A. F. Baumgarten & Bro., Farmers Bank building, Pittsburg, are general sales agents for the company.

The Cameron Steam Pump Works, of New York, have made several recent sales of pumps as follows: The Woodward Iron Co. has put in place four more Cameron Simplex long stroke, and one regular pattern, pumps for use in unwatering their mines at Woodward, Ala. There are in use in the Woodward Iron Co.'s mines quite a number of Cameron regular pattern, and also of the horizontal plunger type and station pumps. The Montevallo Coal Mining Co., at Aldrich, Ala., has installed another Cameron pipe pattern plunger station pump, and the La Follette Coal & Iron Co., La Follette, Tenn., has also put in place one more regular Cameron piston pump. The Cameron Works are also in receipt of recent orders from the National Soapstone Co., at Variety Mills, Va., The Ducktown Sulphur, Copper & Iron Co., Isabella, Tenn., The Red River Oil Co., Alexandria, La., and the Green Bay Phosphate Co., of Bartow, Fla., for several of their removable bushing pattern pumps, and two of their compound outside packed plunger pumps for station duty, to be operated by compressed air.

The Bridgeport (Conn.) Boiler Co. is building an addition to its plant.

MELTING STEEL WITH CAST IRON.*

BY R. P. CUNNINGHAM, HOLYOKE, MASS.

The demand for castings to stand great strength has increased to such an extent that foundrymen are often at a loss how to produce castings up to the required specifications. The manufacturers who are the most often called upon to produce castings of high strength are pump and engine builders, tool makers and car wheel manufacturers.

Take pump builders a few years ago; it was something very unusual to receive an order for a pump to stand a pressure of more than 1,000 lb. Today it is nothing uncommon to get an order for a pump to work under a pressure of 5,000 lb. and even higher. Engine builders are called upon to build engines to work under 200 lb. steam pressure, while it is only a very few years that 100 lb. pressure was considered about the limit.

I might say the same thing about tool making. The speed that the modern tools are run at today is nearly double that of a few years ago. Look at car wheels and compare the tests they are subjected to today with that required 25 years ago. The increase is over 100 percent. Yet car wheel makers have managed to make wheels that come up to the requirements. I might go on and enumerate many other branches of the trade that are doing what was once considered an impossibility. This goes to show that the foundrymen of today are alive to the requirements, and yet we often hear men say that the foundry has not progressed as fast as other branches of manufacturing.

On the contrary, considering the attention that has been paid to the foundry, we have managed to make castings that have been far above the specifications called for. Foundrymen do not always have the iron in their yard to make castings of any required strength, but by a judicious use of steel scrap we can produce castings of the strength desired.

Any one familiar with pump work will readily understand the necessity of having a perfect casting, not alone smooth and true to pattern, but clean, close grained, yet soft enough to machine easily. Many castings go through the machine shop and erecting room, but fail when put under test. This adds cost to the manufacturing cost, as often the machining is many times the cost of molding. By adding a percentage of steel scrap we have in a great measure overcome this difficulty if the trouble is caused by porosity of the metal.

When melting steel with cast iron there are many things that require close attention in order to obtain the very best results. In charging the cupola one cannot be too careful and should be absolutely certain that all the material called for in the charge is put in. The weight of each material specified should be correct, the fuel and fluxes should be analyzed so that the exact composition of all the materials going into the iron to be made may be known.

In making high grade metal we have to contend with the impurities of the fuel and fluxes charged into the cupola besides that we have estimated on in the metal. All impurities in excess tend to weaken the metal in tensile and transverse strength, for this reason there is more difficulty in making a successful cast when using a large percentage of steel scrap.

A high percentage of steel necessarily increases shrinkage, demands closer attention, requires more rapid handling in the foundry, and when very high tends to make all the operations connected with it draw away from those of a cupola metal and approach that of a steel casting. When this extreme point is reached melting in the cupola becomes very unsatisfactory.

The average thickness of a casting bears a relation to the percentage of steel desirable. For thin castings only a small percentage can be used, while for thick heavy castings a large percent is permissible. This is so because a thin casting has no self-annealing power on account of its rapid cooling, and the chilling effects of the mold. The thicker casting, on account of its slower cooling, anneals itself somewhat, and opens the grains of the metal perceptibly. The same metal in a thin casting, which is hard, would be quite soft in a heavy casting. My opin-

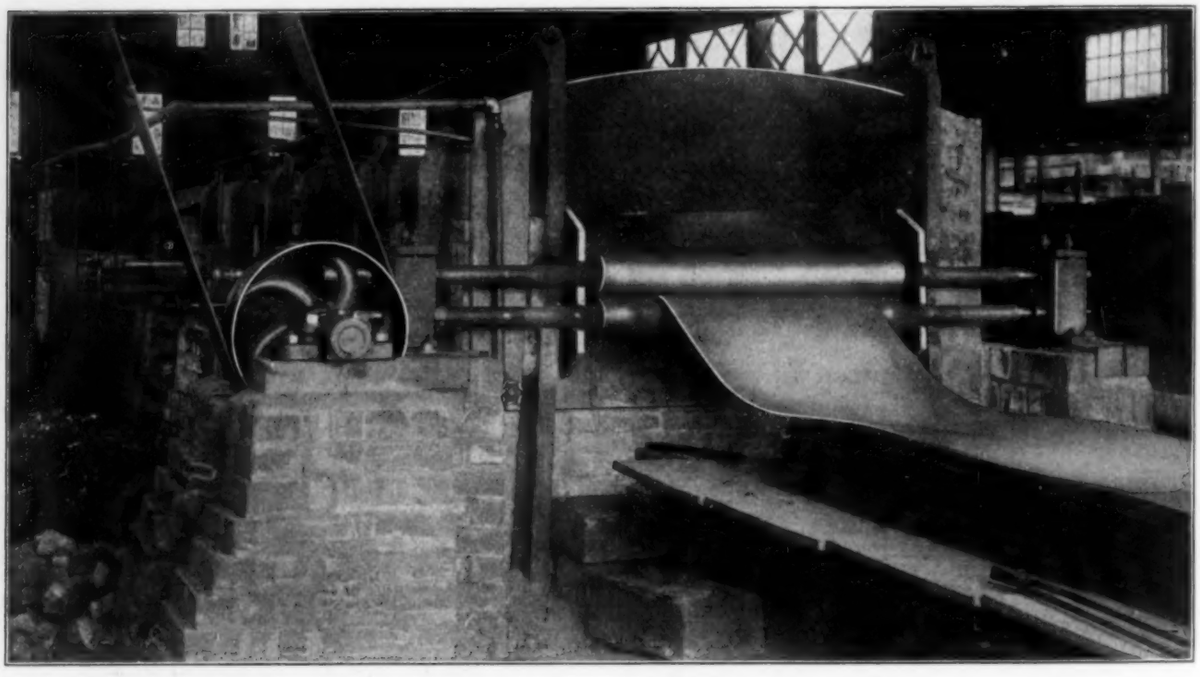


FIG. 2.—THE CONTINUOUS ANNEALING FURNACE.

*Read at the New York meeting of the American Foundrymen's Association.

ion is that it is more desirable to have a mixture with the smallest percentage of steel that will give sufficient strength and solidity to the casting for all practical purposes.

We sometimes doubt the wisdom of the engineer when he calls for castings that will stand so many thousand pounds to the square inch, because the metal that will stand the highest test in the bar is not always the most desirable. It may be brittle or flaky, with no elasticity, and yet test high. What we aim for in practical foundry work is a high grade metal that will stand a fairly high test and machine easily. It is this kind of a casting that can be made with a percentage of steel scrap melted with your iron, provided the rules are accurately followed.

My method of charging a cupola is as follows: Let us say that we want to make a casting which will require 4,000 lb. of metal, with 25 percent steel. With a cupola that lines up 48 in., we put on the bed 1,200 lb. of coke, on top of this put 1,000 lb. of iron, then 500 lb. of steel, then 500 lb. of iron, then 150 lb. coke, 500 lb. steel, 1,500 lb. iron. The coke next above the metal charge should be greater than between the ordinary charges, and the pig iron in the next charge above the steel should be of the same chemical analysis as the iron used in the steel, so that if any metal should melt and run into the steel it will do no harm. With the last amount of steel we add 1¼ lb. of ferro-manganese to every 100 lb. of steel used. We also put the same amount of ferro-silicon into the ladle. This should be done after the first metal has been drawn into the ladle. This metal should be poured as soon as it becomes quiet in the ladle.

If the casting is uneven in thickness attention must be given the shrinkage. Setting a riser on the heavy parts and after the mold is full pouring slowly until the riser is full obviates trouble. If the casting is very heavy it will be necessary to feed it, but an ordinary casting will not require this.

We have found by using two brands of iron, one high in manganese and the other high in silicon, both low in sulphur, that we can get a much finer grained casting, with more elasticity, than we could if we depended on ferro-manganese and ferro-silicon to bring these two elements up to the desired percentage. I reason it in this way: If the manganese and silicon are in the pig they are more evenly distributed than when they are put into the cupola and depended upon the become thoroughly mixed in it or in the ladle. We have never yet depended upon the pig for the entire amount of manganese or silicon wanted, but have added each in the proportion given above.

We sometimes have trouble caused by wrought scrap or hard steel becoming mixed with the steel scrap. In either case satisfactory results cannot be obtained. With hard steel there are hard spots in the casting, while wrought iron increases porousness which is very bad if the casting is uneven in thickness.

My opinion is that mixtures of this kind will in the future be used to a greater extent than they have been in the past because the demand for this class of castings has increased and foundrymen will readily see that by this means they can build up their present mixtures to show greater strength and other desired qualities.

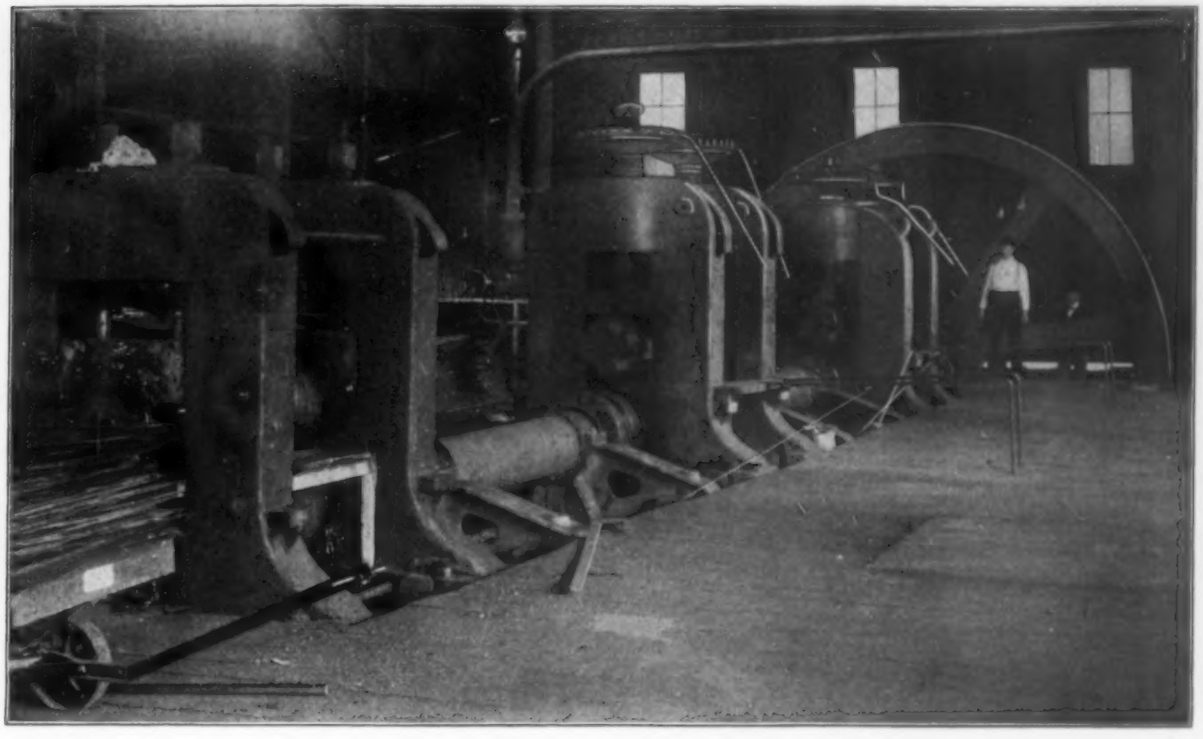


FIG. 3.—THE SHEET MILLS.

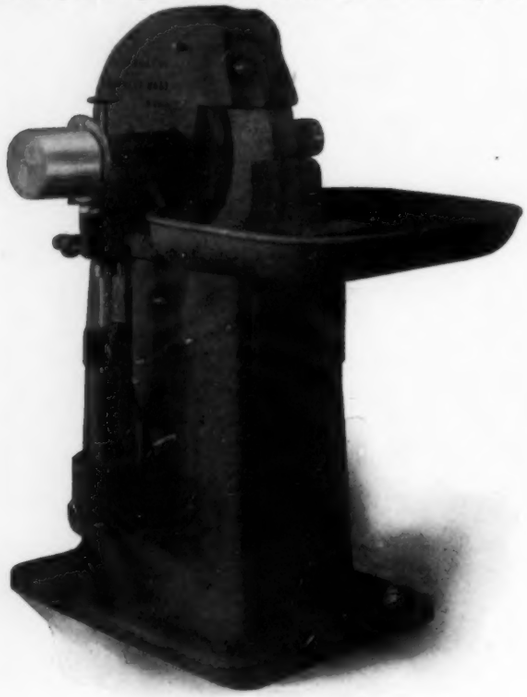
The result of eighteen casts with different percentages of steel showed that the highest amount of steel that could be used to an advantage is 33 percent. Above this showed excessive shrinkage and only a slight gain in strength. The highest point reached for tensile strength was 33,205, the lowest 31,890 for perfect bars. The highest transverse strength shown was 3,335, the lowest for a perfect bar was 3,180. Six bars were cast from each heat, two at the first part, two in the middle of the heat, and two at the end. In every case the two bars cast in the middle of the heat showed up best in tensile and transverse strength. The first bars were not uniform and showed small pin holes. The last bars showed up badly in every instance. Less trouble will be had with less than 33 percent than above that amount of steel scrap in the gray iron mixture.

For ordinary work 25 percent steel will give sufficient

strength for all practical purposes, will machine easily and yet be close grained. This is the percent I would recommend foundry men to use unless it was for some special work. In conclusion I will say that I will be only too glad to answer any and all questions in regard to use of steel in cast iron, for I feel sure that when once tried, that great benefit can be derived.

THE BLOUNT TOOL GRINDER.

The 20-in. water tool grinder manufactured by the J. G. Blount Co., of Everett, Mass., is designed for wheels 20 x 2½ in. with 9-in. hole. This machine has long, self-oiling bearings. It is of heavy construction to resist vibration and has a large deep pan which conducts all surplus water back to the tank in the column. The water is supplied to the wheels by a vertical centrifugal pump which insures a constant supply; the latter may be regulated by means of the valve at the left. The vertical pump shaft is driven by a friction held in contact with the edge of the main drive pulley and runs in self-oiling bearings above the water line and well protected

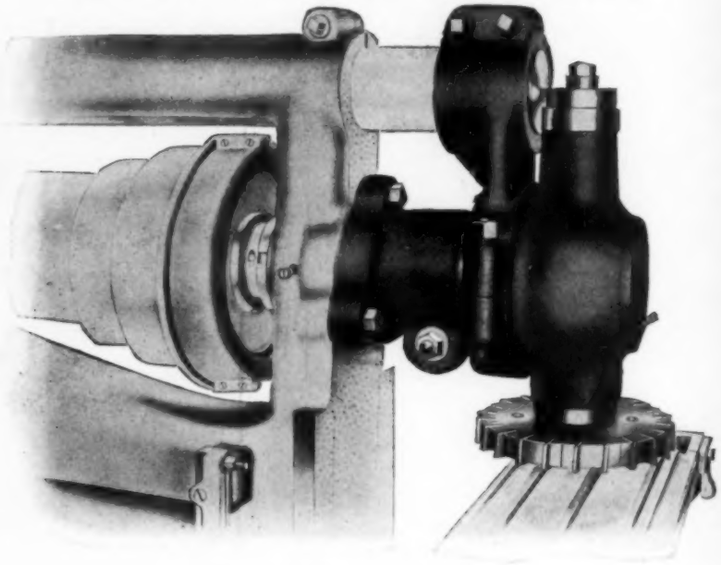


A NEW TOOL GRINDER.

from all gritty substances that may be in the water. These bearings are mounted upon a forked carried pivoted at its lower end; the upper end being secured between jaws having a spring to force the friction against the driving pulley. The pump case is of snail shell design and the pump is so loosely fitted that it does not touch the case at any point and coarse sand can pass through it without injury. It is set low and has a large passage for the water to flow through from the tank in the column. A sleeve cap covers the pump case and prevents leakage without the use of packing, the water line always being below the top of the sleeve. A pan is set below the wheel and extends from the front to the back of the column to catch and prevent the dirt or grit from settling in the tank. The water from this pan passes to the tank below at the farthest point from the pump and the tank is provided with a settling chamber to catch and retain any grit that may have passed the pan. The tank has a large opening at the right side through which it may be cleaned when necessary. The hood which covers the wheel is brought well forward from the center to prevent water reaching the main bearings or flying upon the floor.

VERTICAL SPINDLE MILLING ATTACHMENT.

This attachment is designed by the Kempsmith Mfg. Co., of Milwaukee, to handle the very heaviest classes of milling which the power of the main spindle of the machine itself can stand. It is built out from the face of the column, firmly held and is rigidly supported by a substantial pendant from the overhanging arm, thus holding the attachment secure under very heavy strains. The column is drilled to a jig when building, so that the attachment may be furnished at any subsequent time; in ordering the attachment separately it is advisable to give size, and construction number on face column, of machine on which it is to be used. The bevel gears in the spindle head have large face and coarse pitch and are of case-hardened steel. Bearings for the vertical spindle are very long in order to keep perfect alignment. Only the best bearing metal is used and provision is made for delicate adjustment for wear. The head can be swiveled to any angle of 360 degrees, being graduated in degrees, and the manipulation necessary in setting, adjusting and clamping at any angle is reduced to a minimum. Two bolts only are required to clamp the head securely in any position, and both are very con-



A NEW MILLING ATTACHMENT.

veniently located, as shown in the illustration. The bolt clamping the head at any angle in the bracket is an improved friction bolt affording clamping power. The vertical spindle has B. & S. taper hole, and is threaded for receiving large face milling cutters; the taper hole and thread are the same as on the main spindle, thus making all tools interchangeable. Draw bolts are furnished for drawing in and backing out end mills. This obviates the necessity of hammering out mills, and is of special advantage with heavy cutters, as it holds them positively in place. The head is so constructed that the distance from the center of horizontal spindle to the nose of vertical spindle is kept very short and permits work unusually high from the table.

The British Hele-Shaw Patent Clutch Co., Ltd., has been registered with a capital of £12,000, to acquire and take over the English business of the Hele-Shaw Patent Clutch Co., Ltd., carried on at 34-36 Chatham street, Liverpool; also certain patents and rights relating to friction clutches and brakes and the application thereof, and to carry on the business of clutch manufacturers, engineers, iron and steel makers, manufacturers of engines, tools, machinery, and railway hydraulic, pneumatic, and other plant, steel and iron merchants, founders, etc.

THE TOOL ROOM AND STOCK ROOM.

BY OSCAR E. PERRIGO.

The studious mechanic, ever on the alert for new and up-to-date information relating to the equipment, arrangement, organization and management of the modern machine shop or manufacturing plant, must have noticed, and with some surprise, the lack of discussion in the technical publications on

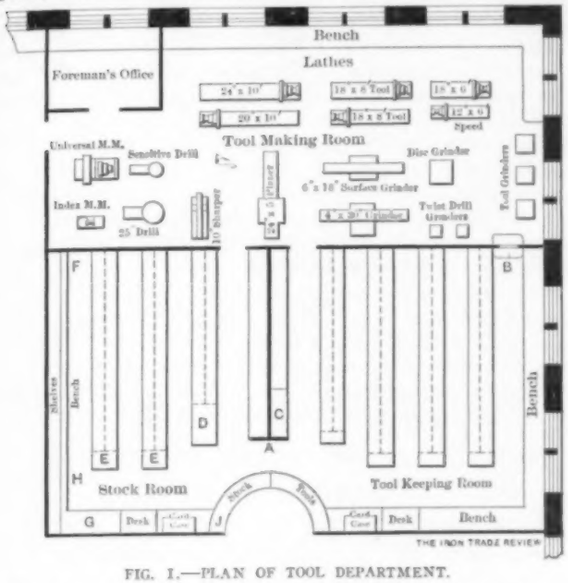


FIG. 1.—PLAN OF TOOL DEPARTMENT.

the subject of the tool room, as well as the stock and store rooms, that in so many shops are intimately connected with all shop routine. Such discussions as we have had heretofore have usually been on particular features, such as tool racks, tool trays, tool checks, steel racks, drawer racks, tool check systems, and so on, but in none of them have we been favored

Name of Company.

MATERIAL AND COST CARD.

Order No._____ Date,_____

Stock	Weight	Cost	Stock	Pieces	Weight	Cost
C.I. Castings						
Mal. "						
Steel "						
Brass "						
Bronze "						
Babbitt						
Mch. Steel						
Cast "						
Tool "						
Wt. Iron						
Pattern Lumber						
Box "						

THE IRON TRADE REVIEW

FIG. 2.—SIZE, 5 x 7 IN. SIX-PLY CARDBOARD. COLOR, LIGHT RED.

with a complete system for the management of the tool room and the stock room. Again, we find many descriptions and illustrations of tools, jigs and fixtures, always interesting and valuable, often indispensable for their particular sphere of usefulness in the shop, but seldom do we see plans or descriptions of how, or where to keep them in the best condition and ready for use. It is no doubt true that in many shops these expensive accessories are often left on benches or under them, or on wall shelves in the rooms where they are used, subject to dirt, dust, rust and the possibility, of accidental injury. We find many disconnected parts of systems for use in the stock or store room; how stock shall be ordered; how it shall be accounted for when it is received; how it shall be issued; how it shall be followed up to know what is on hand, what needed, etc., but never a complete system of management giving the details from the time stock is wanted until it is finally expended and accounted for.

It is proposed, in this article, to take up these matters in

Name of Company.

TIME ACCOUNT.

Order No._____ Completed_____

Department	Amt.	Department	Amt.

THE IRON TRADE REVIEW

FIG. 3.—THE TIME ACCOUNT.

regular order, and to describe and illustrate, as fully as is here possible, the regular routine from the inception of a requirement until its final realization.

The Tool Room.

First to be considered is the tool room. This should be located apart from the general machine shop, as a too intimate connection does not seem desirable in practice, while it is self-evident that it should be convenient to the superin-

Week Ending_____

No._____

Name

Day	Forenoon		Afternoon		Overtime		Lost Time
	In	Out	In	Out	In	Out	
MON.							
TUE.							
WED.							
THU.							
FRI.							
SAT.							
SUN.							

Total Time_____ Hours _____

Rate_____

Total wages for week _____

THE IRON TRADE REVIEW

FIG. 4.—SIZE, 3⅜ x 5½ IN. STRAW-COLORED CARDBOARD.

tendent's office, drafting room and pattern shop, and that it should be well lighted, comfortably warmed and ventilated. This room is properly divided into two sections, the first being the room where tools are made and kept in proper repair, and the second, the room where they are stored, repaired, issued to the machine shop as required and received from

the shop when no longer needed there. This second section may consist of two parts, in one of which lathe and planer tools, milling cutters, drills, taps, reamers, files, jigs, fixtures, gauges, and similar articles are kept, while the other part may contain the articles of stock and consumable supplies usually found in the ordinary stock room, such as machine, cap and set screws, oil cups, metals, the smaller bar and sheet stock, bolts, rivets, nut blanks, oil, waste, emery, emery cloth, etc. It will be much more convenient in many ways to keep these two classes separate for storage purposes as well as for accounting and issuing.

It is assumed that the machinist portion of the tool department, or the tool *making* room is equipped with modern machine tools sufficient in number, variety and efficiency to turn out all the tools, jigs, fixtures, gauges, etc., that may be needed. This equipment will consist of a 24 in. x 5 ft. planer, a universal milling machine, an index milling machine, a 10 in. shaper, a sensitive drill, a 25 in. upright drill, two 18 in. x 8 ft. tool room lathes, one each 24 in. x 10 ft., 20 in x 10 ft., 16 in. x 6 ft., engine lathes, a 12 in. x 6 ft. speed lathe, a 6 in. x 18 in. surface grinder, a 4 in. x 30 in. grinder for cylindrical work, a disc grinder, three tool grinders, and two twist drill grinders. Also, the necessary large and small sur-

Name of Company.

FOREMAN'S ORDER, TOOL DEP'T.

Order No. 5608 *Date* May 1. 1905

WORKMAN'S NAME J. B. Johnson WORKMAN'S NUMBER 74

Plane one main casting one cap and one side Gauge to Blue Print #749

J. H. Hamilton

FOREMAN

The Workman will retain this Order.

THE IRON TRADE REVIEW

FIG. 5.—FOREMAN'S ORDER. SIZE, 4 X 6 IN. COLOR, LIGHT BLUE.

face plates, straight edges, and similar tools and accessories that may be necessary for the production of good tool work.

It is also assumed that adjoining this room is the room wherein tools, jigs, gauges, fixtures, files, etc., used in the shop are kept, and in connection with these, in the same room, or one opening from it, is kept such stock as machine, cap and set screws, round, square and hexagon tool and machine steel, brass, copper and steel wire, sheet brass, copper, steel and fibre, rough bolts, nut blanks, washers and all similar articles of stock, usually found in the machine shop store room, as well as belting, oil, waste and similar consumable supplies. For convenience of administration all these may be under the charge of the tool room foreman, while the special work of caring for, issuing and receiving tools and the issuing of stock may be taken care of by a tool and stock keeper and a young man, and perhaps a boy. There should always be two persons conversant with the location of every item of tools and stock in these rooms, so that the regular work may not be impeded in case of the illness or unavoidable absence of the man in charge.

The engraving, Fig. 1, presents a plan of these rooms, laid out in the most convenient manner, showing the location of the machine tools in the tool making room and the various sections of shelving, racks, bins, counters, benches, etc., in the tool store room and the stock room, all designed and arranged with a view to efficiency and economy of operation, as well as the economical use of the floor space.

In addition to this general tool room there may be other distributing points, as the offices of the several foremen, or auxiliary tool rooms at remote points on the ground floor, or on other floors in case the shop is constructed with several floors. At these points, lathe and planer tools, twist drills, and similar tools may be had by the workmen without sending to the general tool room for them. If this is the case the regular routine of issue by the general tool room will be preserved as though the issues were made directly from it. To carry tools to these auxiliary tool rooms a device similar to the cash or bundle carriers in department stores should be used, while for carrying tools to and from other floors a conveyor consisting of two chains running over pulleys at the upper and lower floors, and provided with pivoted boxes located between them, is very economical and efficient, and in successful use in some of the largest shops and factories.

Duties of Tool Room Foreman.

The foreman of the tool room is supposed to have a small office, that he may have a proper place for keeping the records of the work of the department as well as a private room for convenience in making such sketches, plain drawings, or details as he may find necessary in carrying out the plans for tool making, these not being always worked out in suffi-

Name of Company. MATERIALS.			Name MAT
Required for			Furnished for
Order No. Date			Order No.
Amount	Material	Cost	Amount

THE IRON TRADE REVIEW

FIG. 6.—SIZE, 8½ X 11 IN. COLOR, LIGHT GREEN.

cient detail by the drafting room force, or such as he may wish to devise himself for special work, and to develop as the necessities for them may arise. On general principles all drawings are supposed to be made in the drafting room, and by the regular draftsmen, yet there are times when the initiative in these matters may, with proper authority, be taken by the foremen of the tool room and the experimental room. In such cases the regular finished drawings of record should be made in the drafting room according to the regular rules of that department. In fact, it should be a rule habitually enforced in the whole establishment, that except for urgent reasons, or special orders from competent authority, the regular routine for transacting business should be insisted upon, and that "short cuts to avoid red tape" should be frowned upon and discountenanced.

When in the regular course of shop work, tools, jigs, fixtures, gauges, etc., are required, the superintendent will issue a written order, of which he retains in his order book a carbon copy. These orders will be serially numbered, in duplicate, (for general work in the shop in triplicate), and this individual order number will designate this particular work all the way through such departments as do any work upon it.

The Chief Draftsman and the Tool Room.

As the plan of organization I have advocated provides for two assistant superintendents, the first having under his jurisdiction the drafting room, pattern shop, tool room, experimental room, stock room, power house, iron foundry, forge

shop, carpenter shop, paint shop, shipping room, and yard gang, while the second assistant superintendent has charge of the strictly manufacturing departments, an order for tools will go to the first assistant, who in turn will write in a carbon copy book a similar order for the foremen concerned in the work, furnishing a copy to the chief draftsman and to the foremen of the tool room, pattern shop, foundry and forge shop, for the necessary drawings, patterns, castings and forgings, respectively, and see that they are gotten out and furnished to the tool room foreman.

When the drawings are complete the chief draftsman will notify the first assistant, who, if he desires the job to go on at once, will direct him to send the proper drawings to the pattern shop and forge shop. In making these drawings, and in all subsequent work, the value of time and material will be charged on a material and a cost card of the form shown in Figs. 2, and 3.

The time account kept by the workmen is on a job time card which, in addition to the regular day time card, is registered in a recording time clock, a separate card being used for each job, and the aggregate amount of time so registered equalling the amount shown by the day time card. One of these cards is shown in Fig. 4, which is adaptable to the International card recorder time clock. At the end of the week these cards go to the office, the time clerk receiving the day time card, and the cost clerk the job time cards.

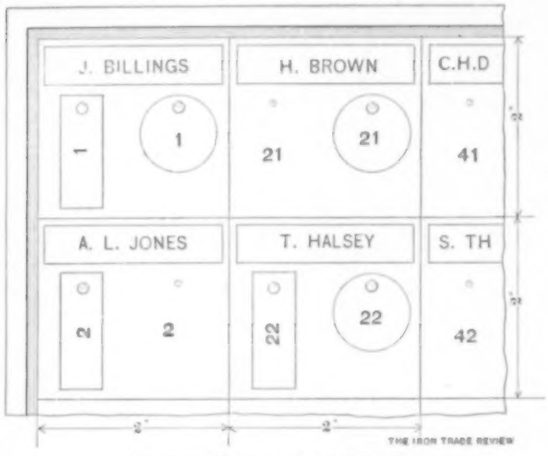


FIG. 7.—THE TOOL CHECK BOARD.

The foreman of the tool room will make written orders in a carbon copying book to the different men doing the machine work in substantially the form shown in Fig. 5, adding a sketch whenever the drawings do not fully show what is required, or that some special method is necessary, or when the sketch will render his meaning more certain than written words. A fairly good sketch with the necessary dimensions can scarcely ever be made to mean what was not intended. Sometimes writing is rather weak in this respect, particularly if it has been carelessly done. This order is retained by the workman as his authority for doing the work, and will often be found useful in settling disputed questions arising where verbal orders were depended upon.

Requisitions on the Tool Room.

Whenever stock or material is required from the stock room, or from any other department it will be drawn on a "Material" requisition of the form shown in Fig. 6. This requisition is written in duplicate, one part being retained by the foreman of the department furnishing the material, and the other part returned, with the material, with the costs entered upon it. Purchased parts require a similar requisition, of yellow paper, with the printed matter changed to suit its use. All stock and material drawn or received from whatever source will be entered on the material and cost card, so as to furnish an accurate account of all shop expenditures on the job as it passes through its various stages. Any department other than the tool room doing any work on tools will send with the work their own material and cost card when the job is turned in to the tool room. These cards will be sent, together with the tool room card, to the cost clerk when the job is completed. The time of the foreman of the tool room will be charged against any order on which he may be nearly exclusively engaged, but this will seldom occur, and it will be safer as to general results to make his salary one of the so-called non-productive charges, the same as that of the other foremen, or the assistant superintendents. The same may be said of the errand boy who will be found necessary in this department. By the use of these blanks and the time card system there will be a minimum of clerical work to be done, and this may be easily handled by the foreman who will thus keep in closer touch with the routine work, distribution of time and the cost of the work turned out. Occasionally the tool room does work upon the regular product of the establishment. There may be some machines in the tool room equipment which are better adapted for certain work than those in use in the manufacturing departments, or it may be that there is less tool making than usual, and some work is put into this department for the purpose of keeping the force engaged rather than to temporarily transfer some of the men elsewhere. When such work is done in the tool room it will be handled exactly as it would be in one of the manufacturing departments, and be subject to the same rules and routine, as well as under the supervision of the second assistant superintendent, who is in charge of the manufacturing operations in general.

PERMANENT ISSUE OF TOOLS.

*Name*_____ *No.*_____

TOOLS.	ISSUED.	RETURNED.

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FIG. 8.—PERMANENT ISSUE TOOL CARD. SIZE, 3 X 5 IN. COLOR, WHITE.

Tool Room Design.

The enclosing partition of the tool department should not be wholly of boards, as this will very much impede the light. Neither is it necessary that it should be entirely of wire netting. A much better plan will be to build it of ⅞ in. matched sheathing, set vertically, and to a height of 42 in., being finished with a strip covering the top ends of the boards and another at the bottom to cover the floor joint. Above this wood work should be four feet of wire screen, which may be tacked to 2 x 3 in. uprights and finished at the top with a cap and moulding. If something more expensive is desired, gas pipe uprights may support an ornamented iron rail at the top, and a wire screen of lozenge-shaped mesh may be used instead of that of square or hexagonal mesh. This screen need not be finer than one inch mesh, and the larger the mesh the less it will impede the passage of light.

The tool store room, or tool keeping room, shown in the plan, Fig. 1, is fitted up with a bench on two sides and a semi-circular counter which, in conjunction with the stock room, furnishes a very convenient arrangement for receiving and issuing tools and stock. This counter may be closed with a wire screen in front having in it an opening for each room through which articles may be passed. The counter should be 42 in. high and the benches 30 in. A door may open beneath the counter and a portion of the counter top be hinged to turn out of the way to admit large packages of stock, as a bale of waste, a barrel of oil, etc. This opening

need not be over 30 in. wide. The remaining space beneath the counter may be fitted with shelves for holding articles frequently called for and so placed as to be in convenient reach.

The sections of shelving are made 30 in. wide at the bottom and 20 in. wide at the top. They are shown as divided in the center, providing two series of shelves from ten to fifteen inches wide. Should wider shelves be desired for some special articles this central division may be omitted. At the partition between this room and the stock room proper is a series of shelves 20 in. wide. The sections of shelves may be 8 to 10 ft. high according to the quantity of tools to be stored. If much above ordinary reach there should be sliding step ladders at each passage. A portion of the front end of each section is arranged with cross shelves, of a width to suit the tools more frequently used, so as to bring them in convenient reach of the tool keeper. Upon the bench at the right of the room and upon one or two strong shelves beneath it may be stored large fixtures too heavy to be conveniently kept on the section shelves.

The tool check board shown in Fig. 7, may be located at A. At B, is an opening above a broad shelf, where dulled tools, drills, etc. may be passed through to the tool grinders in the tool making room, and returned by the same way when ground, more conveniently than to carry them around by the door. Long arbors may be placed on end at the back ends of the passages, proper racks being provided for them.

Files should be kept in a case of pigeon holes of suitable

Name of Company.

STOCK AND SUPPLY REQUISITION.

No. _____ *Date* _____

Name

STOCK

No. _____

AMOUNT	ARTICLES	COST	AMOUNT	

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FIG. 9.—STOCK AND SUPPLY REQUISITION. SIZE, 5½ x 8½ IN. COLOR, PINK.

dimensions, the smaller ones at the top, the coarser cuts at the left, and similar shapes of the different sizes under each other, a good arrangement is this; reading from left to right; first shelf, flat bastard, flat second cut, flat smooth, fine mill, hand smooth, square bastard, square second cut, square smooth; for the next shelf, half round bastard, half round second cut, half round smooth, coarse mill, taper, (triangular), round bastard, round second cut, round smooth. Thus two horizontal rows of eight pigeon holes each are required for each size from six inch up. With the exception of special shapes, one row of eight pigeon holes will be sufficient for each of the three, four and five inch sizes. By the above arrangement the tool keeper will soon memorize the positions of each size and shape so as to handle them rapidly. There should be large spaces at the bottom for surplus stock, this space being more difficult to reach in the ordinary issue of files and quite as good for keeping surplus stock. The location of this case is at C, so as to be in convenient reach of the tool keeper.

Tracing the Tools.

There seems to be a great diversity of opinion as to the best system for issuing and receiving the ordinary tools kept in the tool store room, such as drills, taps, tap wrenches, reamers, etc. If we study the conditions of the case a little we will, no doubt, arrive at several conclusions that will help to solve the problem. Some of them are these: The tools wanted should be delivered with the least possible delay. Therefore they should be so arranged that no time is lost in looking for them. Their location in the shop should be known whenever they are not in the tool room. Every man having tools from the tool room should be held responsible, not only for the safe return, but for the condition of the tools while in his hands. Therefore the tools, as they are brought in, or as soon thereafter as possible, should be examined as to their condition, before the transaction is completed by the replacing of the tool check on the board. The time of the workman is too valuable to be spent in going after tools and returning them, or in grinding them. Therefore they should be delivered and returned by errand boys. These conclusions having been arrived at we may arrange a system in accordance with them.

The plan of using brass checks in issuing tools for indicating their location is most simple, and by the use of duplicate checks it can be made most efficient, giving at any time the location of any particular tool and also the number of tools in the possession of each and every man. For this purpose a board containing a list of names of all the men to whom tools are to be issued is provided, a small section of which is shown in Fig. 7. Beneath each name, which is printed or written on slips of cardboard and tacked to the board with small brass pins, are two pins or hooks capable of holding a dozen brass checks. Two forms of checks are used. Circular ones about ⅞ in. diameter with the individual number of the man stamped with ¼ in. figures. Another set of checks are

STOCK LEDGER CARD

ARTICLE _____ MAX. _____ MIN. _____

RECEIVED		ISSUED						
DATE	AMOUNT	DATE	AMOUNT	DATE	AMOUNT	DATE	AMOUNT	TOTAL
FORWARD								

TOTAL _____ FORWARDED _____ TOTAL _____

THE IRON TRADE REVIEW

FIG. 10.—STOCK LEDGER CARD. SIZE, 4 x 6 IN. COLOR, WHITE.

½ x 1¼ in. also with the man's number stamped upon them. The same numbers will also be stamped under the check pins on the board. Twelve of the circular checks are given to each man and twelve of the rectangular checks are hung on the left hand check pin beneath his name. When he sends for a tool he sends one of his circular checks. This is hung on the right hand pin under his name and one of the rectangular checks is put in place of the tool in the tool rack or on the shelf. If he sends for another tool the circular check which he sends is added to the first one. Therefore the location of the tool is shown by the presence of the rectangular check in the tool rack, while the number of circular checks under his name shows how many tools he has out. At the end of the week all tools are called in and the workmen's checks returned for the next week's routine. This is done so that if any mistakes have been made during the week they may be rectified. By this method we have only to glance at the board to see how many tools each and every man has in his possession, and if any particular tool is absent, the check in its place shows at once who has it. By this system there are no cards to change, no books to keep, or written entries of any kind to make in the process of issuing and receiving tools, and as the work forms a considerable majority of the tool keeper's work, the saving of time over any system requiring written entries is about one-half. Besides this, the soiled fingers of the tool keeper soon deface cards and books and should be avoided when possible. There should be a sufficient number of errand

boys at different points in the shop to quickly answer all calls for tools and to return them to the tool room promptly. Their wages will be small in comparison with the time that would be lost by the men in doing similar duty. With lathe and planer tools, etc., each operator should always have a spare tool at his machine in good condition for use. He may then take out a dull tool and send it to the tool room where it will be exchanged for a sharp one, and have no delay but in changing tools in his machine. The original sharp tools only are charged to him at the tool room. These charges, as well as similar ones for tools used continually, are made upon cards containing the man's name and number at the top, following which is a list of tools in his possession for his regular work, and which he may retain for months, the dulled, worn, defective or broken ones being replaced from day to day. The form of this card is shown in Fig. 8.

In the regular course of manufacturing work there are certain sets of tools, jigs, gauges, fixtures, etc., required at one time. For instance, where a lot of holes are to be drilled and tapped there will be required a tap drill, a set of three taps and a tap wrench. Or, where a certain machine part is to be milled there will be needed one or more milling fixtures with the necessary milling cutters. Or, a part to be drilled will require a drill jig and drills of the various sizes to go with it. These sets of tools and fixtures should be kept in separate boxes provided with a hinged cover, lock and key. The contents of the boxes are plainly marked on the outside, as, for

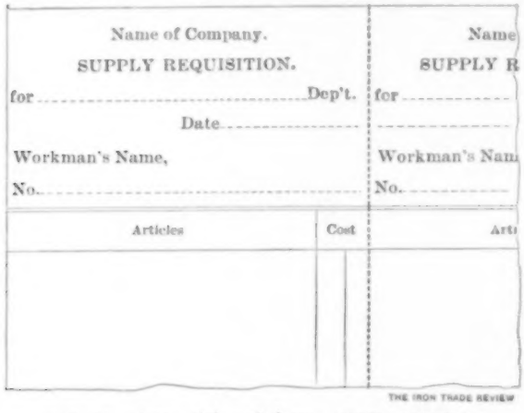


FIG. 11.—SIZE, 5½ x 8½ IN. COLOR, MANILA.

instance, "Milling, Part D-135," "Drilling, Part P-24," "Drill and Tap, ⅝," etc. In arranging these boxes on the shelves they should be grouped according to their purposes, or the machines to which they pertain. For instance, those for drilling and tapping, and the shelf so marked on its edge. Sets of jigs, gauges and fixtures should be grouped in a section of shelving according to the machines to which they belong, then grouped according to the particular part to which they pertain. These sets of tools are issued only on a written order from the foreman of the department where they are to be used. They are accounted for by the card system in the following manner. There is a separate card for each set of tools. These are arranged in one or more drawers marked "Tools in," the guide cards showing the machines to which they refer, or if general in character, the kind of tools, as drilling and tapping, drilling and reaming, etc. When a set of tools is issued the card representing them is removed from its accustomed place and filed in another drawer marked "Tools out," the guide cards in which will indicate the department to which the set of tools were sent. When the set of tools is returned the card is restored to its accustomed place. Thus there is no writing necessary, the simple changing of a card answering all purposes of a book and being much more convenient for reference. Each card contains a list of all tools or pieces that are contained in the set.

Stock Room Arrangement.

At the left in Fig. 1, is shown the plan of the stock room, access to which for the purpose of drawing stock and supplies is by way of the area at the left, in front of the semicircular counter. This room is arranged in a similar manner to the tool keeping room, with sections of shelving between which are passages, or alcoves, for conveniently reaching any part of them. These shelves are arranged for the reception of boxes, drawers, sheet iron trays, or whatever form of receptacle may be needed for the particular form of small or large stock to be kept. Up to a height of 42 in. they may be formed as bins for holding the larger sizes of round and hex. head cap screws, set screws, washers, rivets, nut blanks and similar stock. The smaller screws as round and flat head machine screws, cap screws, set screws, etc., may be kept in trays or boxes, or left in the original packages on the shelves. Small stock such as oil cups, brass cocks, gas fittings, etc., should be kept in trays or boxes, on the shelves. Bar stock, such as drill rods, square tool steel, round and square cold drawn machine steel and similar stock, should be kept in deep pigeon holes which take in nearly the whole length, and is provided for at D. Sheet steel, brass, copper and fibre should stand on edge, in a case provided with vertical partitions two inches apart, and may commence near the floor and consist of three or more sections, one above the other. These are located at E. E. Lubricating oils are kept in vertical cans holding a barrel each, and set in drip pans on the bench at F. Belting should be kept in the rolls, set on edge between upright partitions arranged under the bench at G, this location being selected for convenience in stretching out a piece of belting down the passage to the rear in measuring it to the required length by brass-headed nails driven into the floor at proper intervals. Waste, or whatever substitute is used in lieu of it, is kept under the bench at H. Stock issued by weight will be weighed on a proper scale located on the counter at J. Brass, steel and copper wire in coils may be hung on brackets or pins over the shelves at the left side of the room. Small coils of wire, as of music wire for springs, should be kept in drawers or boxes on the shelves. In all cases the stock keeper will so locate his stock that the kinds most frequently called for will be the most convenient to reach, so far as it is possible to do so.

The construction herein described is of wood for reasons of economy, as it can be built by the carpenters employed about the plant. It is not by any means the best construction however, and several new and improved forms are in use that offer important advantages in several ways. One of these is a skeleton rack formed of uprights composed of thin iron castings set at any desired distance apart to accommodate sheet metal drawers which rest on horizontal ribs cast on the uprights, which are held together by rods and sections of pipe to act as distance pieces. Thus sections may be made of any length, and to suit drawers of any width. These sections are double and accommodate two series of drawers, their backs coming together. Only one pattern is necessary for these supports, the projecting ribs forming the drawer supports being stopped off in the outsides of the uprights at each end of the sections. If drawers of twice the depth of those usually used are desired, each alternate rib may be stopped off for that purpose.

Another method is to build up the sections of angle iron or steel instead of cast iron uprights, riveting on angle strips to act as drawer supports. In this case too, the drawers are made of sheet steel. The sections are made as in the former case for two series of drawers, their backs coming together. Double depth drawers may be arranged for when the supporting strips are riveted on.

Both of these methods afford a considerable protection to their contents against fire, while their construction is such as to render them very serviceable and lasting.

Still another plan is to have the sections built of wood with the shelves inclined to the front about twenty degrees and their front edges provided with a strip one inch high. Upon these shelves is a series of sheet iron pans from two to four

inches deep and of suitable length and width. Ordinary baking pans may be used for this purpose. There may be upright dividing partitions between the pans, or not, as may be desired. They are not really necessary and to use them adds fifty percent at least to the cost of the sections over what it would be if they were omitted. The shelves are inclined for convenience in seeing the articles contained in them.

Stock Room Supplies and Accounting Systems.

The method of keeping the stock room supplied with the articles necessary to issue, and the manner of issuing and accounting for them will next be considered. It is the duty of the stock keeper to see that he always has a sufficient quantity of all kinds and sizes of stock to meet the probable demands that will be made upon him. When more of certain kinds is wanted he will make a requisition on the purchasing clerk upon a duplicate form shown in Fig. 9, sending him the first half and retaining the other part as evidence of what he has called for. When the stock is received he will check off the articles on this blank, and wait for the invoice, which the purchasing clerk will send him. This he will check from his portion of his requisition, upon which he will enter the costs.

In order to keep a correct account of all stocks received and issued; to know when a sufficient quantity of each article is on hand for issue; when to make requisition for more; and to be able to ascertain quickly at any time the amount of any one article on hand, the stock ledger card shown in Fig. 10, is used. There will be a separate card for each kind and size of stock. All stock will be classified and proper guide cards will readily show the location of each class of stock cards. These classes will be sub-divided when necessary, the class guide cards and the sub-class guide cards being of different colors. These sub-classes may be advantageously again divided in some instances. For instance; Class, cap screws, subclasses, round and hex. heads; in each of these sub-classes, soft and case hardened. Nut blanks; square and hex. Sheet steel; machine steel, spring steel and tool steel. Sheet brass; hard and soft, etc.

When stock is received it will be entered on the proper card, giving the date of its receipt. As quantities are issued the date and amount is entered at each issue, the total carried out on the horizontal line, and at any time added vertically and subtracted from the total amount received will show the balance on hand. When this card is filled up the amount on hand is ascertained and carried on to another card against the word "forward," and future operations entered as before. In order to prevent an unnecessary amount of any one stock, or of allowing the amount to get below a safe minimum, the stock keeper will watch the condition of his stock, note the amount issued within a certain time, and soon be able to fix maximum and minimum limits, within which the stock of each particular article is to be kept. These amounts he will enter on the upper right hand corner of the proper card. Should his first estimate in this respect not prove correct he may change it on subsequent cards. By careful attention to this point he may save much unnecessary outlay for stock kept on the shelves, and should any changes occur he will have less old stock to work off. Once every three months the stock on hand may be inventoried as a check on the card account. If found substantially correct these periods may be lengthened to six months.

All consumable supplies issued will be upon requisitions of the form shown in Fig. 11. These will always be signed by a foreman, or other authority. One part of this blank will be retained by the stock keeper and the other part, with the costs entered upon it, returned with the supplies.

Still another division of the store or stock room may be a store room for small finished parts purchased from outside manufacturers. The general system of receiving them and accounting to the purchasing clerk, caring for them and issuing them upon proper requisitions, is the same as in accounting for stock and supplies.

DEATH OF CHAS. A. OTIS, SR.

Chas. A. Otis Sr., from 1872 to 1874 mayor of Cleveland; prominently interested in the iron and business world of Cleveland and one of the notable figures in the industry in the United States, who died at the home of his son, Chas. A. Otis Jr., Cleveland, June 28, as announced in *The Iron Trade Review* last week, was one of Cleveland's conspicuous citizens, one of the first men to build up and successfully operate a steel mill and a man, who, 30 years ago, was widely known. He was born in Bloomfield, O., and with his parents moved to Cleveland when nine years old. In 1853 Mr. Otis, under the firm name of Ford & Otis, set up the first forge in Cleveland. He later sold his interest to travel and study in Germany. He returned to Cleveland in the late sixties. At this time he formed the Otis Iron & Steel Co., now the Otis Steel Co., and associated himself with E. B. Thomas, Thomas Jopling, J. K. Bole and S. T. Wellman. He was one of the founders of the

CHAS. A. OTIS.

American Wire Co., which later became the American Steel & Wire Co. He also had extensive interests in the West. Among other Cleveland enterprises, in which he was interested, are: The Cleveland Electric Railway Co., the American Wire Co., Page Car Wheel Co., Commercial National Bank, Standard Sewing Machine, the American Steel Screw Co. and the Society for Savings. His father, W. A. Otis, was one of the organizers of the latter bank. The direct cause of his death was due to a weakened condition following an operation for appendicitis. June 25, was his 78th birthday.

Production of steel in Germany was 8,930,291 metric tons in 1904, 8,801,515 tons in 1903, 7,780,682 tons in 1902, 6,394,222 tons in 1901 and 6,645,869 tons in 1900. In 1904, 610,697 tons were acid and 8,319,594 tons were basic steel, there being produced by the Bessemer process 423,742 tons of acid and 5,525,429 tons of basic steel, and by the open-hearth process 130,546 tons of acid and 2,697,760 tons of basic steel. Of the output of steel castings 56,409 tons were acid and 96,405 tons basic steel.

MACHINE FOR CUTTING PINIONS AND INTERNAL GEARS.

A machine cutting and finishing all the teeth upon pinions and sprockets in one operation is soon to be placed upon the market in this country. The device, which has been in use for some months in England, has been patented by Robert Walker Smith, of Stoneleigh, Reddlitch, England, the rights for this country, some of which are still pending, will be held by Halbert E. Payne, 265 Broadway, New York. *The Iron Trade Review* of Dec. 1, 1904, in the department of "New Things for the Shop," had some description of the primitive device.

The outward form of the perfected machine requires little explanation. It is an ordinary broaching press in which the blank is fed into the tool or the tool into the blank by a worm gear. The cutting device is, however, novel and interesting, the pinion or gear tooth being formed and finished by a succession of cutting edges so arranged that each edge removes

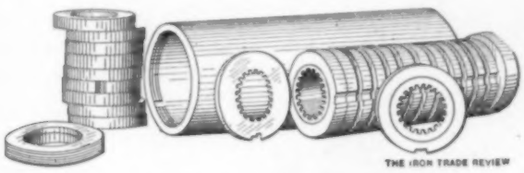


FIG. 1.—THE CASING, CUTTERS AND FLANGES.

a cut about equal to that made by one stroke of a shaper, and the number and arrangement of the edges being such that one stroke of the machine converts the blank into a finished pinion.

The tool case, or broaching box, Fig. 1, has cutting edges which are portions of a series of hardened steel rings. The device consists of a number of hardened cutter rings within a casing or box having at one end a retaining flange and at the other a screw cap. The rings are formed internally to appropriate tooth-shaped cutting edges which, when acting in combination, commence with broad and shallow cuts and gradually approach the finished gear form at the other end of the tool. A key is fixed in the casing and holds the cutters in alignment. The blank is forced through the tool by means of a plunger or broaching rod. The casing, cutters and flanges are shown in Fig. 1.

The device has been used with great satisfaction in the gun

FIG. 2.—THE GEAR BROACHING MACHINE.

works of Vickers, Son & Maxim and in a plant for the manufacture of bicycle parts. In a department for the manufacture of changeable speed gears, three machines, one of which is here shown in Figs. 2 and 3, are said to have effected a saving of $10,000 in one year. The machines are operated by boys fifteen or sixteen years of age, and the power required is very small. Small pinions are cut at the rate of three per minute, while of 1½-in. steel pinions 30 per hour are finished upon each machine. While the device has hitherto been used only for comparatively small work, there is no reason why the same principle could not be applied to larger and more rapid operations, speed and size being limited only by the dimensions and power of the machine employed.

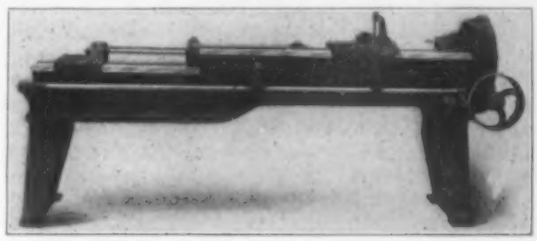


FIG. 3.—ANOTHER VIEW OF GEAR CUTTER.

The tool for cutting internal gears is the exact reciprocal of the broaching box described above, the cutting edges being arranged upon a rod, Fig. 3, the whole forming a tool resembling in appearance an ordinary reamer. In this case the blanks are fixed in a casing or box.

The principle involved is in both cases that of cutting by means of the shaper, with this difference, that the return stroke of the shaper after each nibbling cut is saved, and that all the teeth are finished at one and the same time, the cutting edges being, in fact, sharper-cutters brought to the work in team and tamdem arrangements.

New Railroad Equipment.

The Missouri, Kansas & Texas has ordered 30 locomotives from the Baldwin Locomotive Works. The Michigan Central has ordered several heavy compound freight locomotives from the Locomotive & Machine Works Co., of Montreal (American Locomotive Co.). The Chicago, Burlington & Quincy has ordered 10 Atlantic type locomotives from the Baldwin Locomotive Works. The Butte, Anaconda & Pacific has ordered two compound Mastodon locomotives from the Schennectady Works of the American Locomotive Co., for July delivery. The Canadian Pacific is building three simple Pacific type locomotives with superheaters at its Angus shops. The Chicago,

FIG. 4.—BROACH FOR INTERNAL GEAR CUTTING.

St. Paul, Minneapolis & Omaha is having four simple Atlantic type engines built by the American Locomotive Co. for delivery in December. The Lehigh Valley has ordered 100 side-dump steel cinder cars of 80,000 lb. capacity from the Standard Steel Car Co. The special equipment includes: American cast-steel bolsters, Westinghouse air-brakes, Magnus Metal Co.'s brasses, Gould friction draft rigging, Symington dust guards and journal boxes, Protectus paint, and Railway Steel Spring Co.'s springs.. The St. Louis & San Francisco is reported to have ordered 1,500 steel hopper coal cars of 100,000 lb. capacity. The Ironton Railroad Co. has ordered 10 hopper bottom gondola cars of A. V. Kaiser & Co. The St. Louis & San Francisco is asking prices on 1,500 dump cars, 200 hopper cars and 500 to 1,000 flat bottom gondola cars, in addition to the 750 box cars for the Chicago & Eastern Illinois. The New York, New Haven & Hartford railroad will purchase soon a large amount of electrical equipment, including cars and trucks, and will order two mail cars.

The Simonds Mfg. Co., Fitchburg, Mass., is making large additions to its saw manufacturing plant.

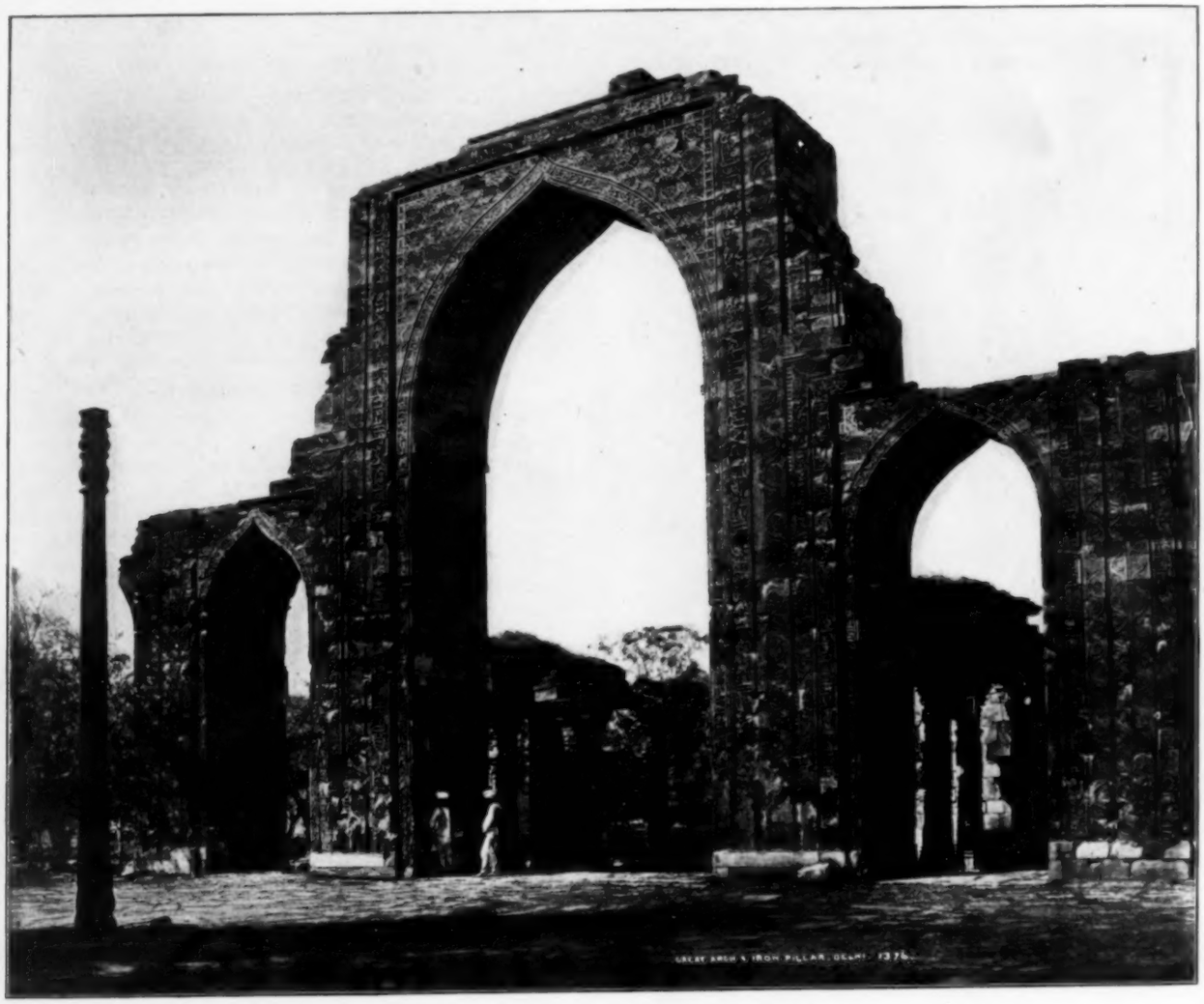
THE IRON PILLAR AT DELHI.

When one goes to India he is apt to have his ideas of modern achievement and civilization considerably changed. Americans usually think they are the only ones who know how to produce large forgings, and yet on the plains of Delhi, the ancient capital of India, near the Kutub Minar, stands an immense iron pillar which is the most curious antiquity of all India. It is a wonderfully fine forging 50 ft. long and 16 in. in diameter. It rises 22 ft. above ground—the remainder is below ground. There are several weird legends connected with its history and its exact date is unknown, but it is certain that it extends back into the past to a date before our boasted Western civilization even had a beginning. It records its own history in Sanskrit in a deeply cut inscription on its face, and students assign the third or fourth century after Christ as the date of this inscription. The Colossus of Rhodes and the statues of Buddha described by Hiown Thsang, the old Chinese traveler, were of brass or copper, hollow, and of pieces riveted together, but this "Pillar of Fame" is a solid shaft of wrought iron.

In one of the temples of India there are some iron beams supporting a portion of the building which are almost as remarkable forgings as the pillar itself and probably as old. These beams are about twice as deep in the center as at the ends, showing that the people of that remote age understood how to distribute the material in the beams to the best advantage. It is exceedingly interesting to know that these great forgings which were made over fifteen hundred years ago still stand as a monument to the ancient indutries of India.

India boasts of exceedingly rich deposits of iron, but unfortunately the iron ore and flux are widely separated and the coal is so high in ash that it has not been possible to work deposits by modern methods. The most primitive furnaces were probably short shaft, built in the underwind side of a hill, the wind furnishing the blast. Charcoal was used as fuel and the ores reduced in small quantities. The thick masses of iron were raked out of the bottom of the furnace and forged into shape so that they could subsequently be welded into large masses, if required. Later the furnaces were equipped with bellows and their height greatly increased, until it reached about 10 ft., and the output was greater than that of any other primitive iron-making furnace. It is interesting to know that cast iron was probably first made in these furnaces of ancient India, but it was made as the result of an accident and was always thrown away with the slag. When the draft became especially good and the furnace was very hot it would sometimes make a few hundred pounds of cast iron, which would run out of the slag and be thrown away. These tall furnaces are still used in some remote districts of the Himalayas, but they are fast being displaced by iron and steel products imported from Europe and America.

The iron pillar at Delhi has always been bright and some



IRON PILLAR OF DELHI WITH ARCH OF KUTUB TO THE RIGHT.

writers attribute this to the fact that certain of the pilgrims divined this pillar as a part of their religious observances, and claim that the grease and oil applied to it in this way protected it, but it is probably true that the surface is covered with a black oxide rust which has protected it from further oxidation. Several attempts have been made to obtain a sample of the iron for analysis, but as the natives regard the pillar with superstitious awe, no complete analysis of the material has been made.

Wondrous does this tale of a past civilization become when one remembers that it has been only in late years that any modern nation has been able to create anything like so massive a pillar of wrought iron.

ASSAULT BY STRIKERS.

The Court of Appeals in New York has handed down a decison on the question of whether an injunction must be served personally in order to punish for criminal contempt, which point has never been adjudicated before. This question was caused by some strikers assaulting non-union molders who were employed during the strike of E. C. Stearns & Co., of Syracuse, N. Y., in 1903. The decision as delivered by Judge Vann is: "While there is a distinction in the nature of civil and criminal contempts, there is but slight difference in the procedure to punish and no requirements peculiar to either as to the personal service of the order, as distinguished from the actual knowledge of its existence and contents, however acquired. As it respects disobedience to the order of a court, the sole difference appears to be that a willful disobedience is a criminal contempt, while a mere disobedience by which the right of a party to an action is defeated or hindered is treated otherwise. The primary object of the one is to protect private rights and of the other to maintain the dignity of the court and vindicate the authority of law. As each of the appellants knew of the existence of the injunction and its terms and clearly understood the nature of his acts, he was properly adjudged guilty of a criminal contempt, for his willful disobedience tended to cast discredit upon the administration of justice." It will be necessary for three striking molders to serve out sentences upon this decision.

Secrecy of Engineers' Building Committee.

The gentlemen who are responsible for the expenditure of the sum set aside by Mr. Carnegie for a New York City home for the three engineering societies have lately been keeping things to themselves as effectually as the Japanese war lords. Although plans of some kind have been in the hands of contractors for a fortnight or more, not a detail has leaked out. Even the amount of steel to be used appears to be a doubtful if not variable quantity. To members who are wondering about their new building the following reasons for this rigid censorship may be of interest: It is true that tentative plans have been submitted to builders but nothing has as yet received the final approval of the committee. The plans are subject to change because specifications and the expense of carrying them into effect do not automatically adjust themselves to one another and the sum to be spent is fixed. Some element of flexibility is necessary, and the usual order of procedure must therefore be reversed and the plans must be made to fit the cost. Changing the plans of the building is an exceedingly delicate operation owing to the multitude of difficulties which have never been met before. Lecture rooms are to be provided in which it is possible both to hear and to speak; there are committee rooms and libraries to be arranged and all the associations have equal rights. The committee members are determined to make no mistake and therefore are keeping their own counsel.

The Hendey Machine Co., Torrington, Conn., has awarded the contract for the construction of a $50,000 factory.

PRESIDENT CHAS. B. DUDLEY.

President Charles B. Dudley, of the American Society for Testing Materials, is of New England parentage. He was born at Oxford, N. Y. on July 14, 1842. Dr. Dudley is primarily a graduate of the village school and the farm. He enlisted as a private in 1862 in the 114th New York Volunteers and was in seven battles. He was at the siege of Port Hudson in 1863, went through the Red River campaign early in '64, and was seriously wounded in battle just east of Winchester in the Shenandoah Valley in September, 1864. He closed his military career in 1865 and prepared for college, entering Yale University in the fall of 1867, graduating in the class of 1871. Then came some newspaper experience while he accumulated funds to prosecute further studies. In the autumn of 1872 he entered the Sheffield Scientific School and graduated in 1874 with the title of Ph. D. Most of the two years' course was spent in chemical studies. His next year was employed as assistant to the professor of physics at the University of Pennsylvania. Dr. Dudley became teacher of sciences in Riverview Military Academy at Poughkeepsie

CHAS. B. DUDLEY.

September, 1875. He was engaged thus for but one month, as on Nov. 10, 1875, he accepted the position of chemist to the Pennsylvania Railroad Co., at Altoona, and still holds that appointment. During this 30 years Dr. Dudley has made some noteworthy investigations of value to engineers. His work in the research pertaining to a close examination of steel rails, specifications for materials, the ventilation of passenger cars, car lighting, and steam heating, his studies of disinfectants, investigations of paints and bearing metals, etc., analyses of coals, and examination of water supplies, have attracted wide attention. He made an exhaustive study of explosives resulting in the formulation of rules governing the transportation of these and other hazardous materials. Some idea of the work of Dr. Dudley's department is shown by the fact that the total number of tests and chemical determinations made in his laboratory in connection with shipments of materials amounts to about 60,000 per year. Dr. Dudley has twice been abroad on business for his company. He studied oil burning on locomotives in Russia in 1886 and in 1900 he was delegate to the International Railway Congress in Paris. He has twice been president of the American Chemical Society, and has been vice president of the American Institute of Mining Engineers. He is a member of the Iron and

Steel Institute, the English, French and German Chemical Societies, the Verein Deutscher Eisenhuttenleute, as well as the Society of Civil Engineers, Mining Engineers and the Electrical Engineers of this country.

THE TECHNOLEXICON.

The Technolexicon of the Society of German Engineers is making good progress according to a recent report from Dr. Jansen. This communication presents in brief the status of the work up to June of this year. In the compilation of this universal technical dictionary for translation purposes (in the English, German and French languages), that was commenced in 1901, about 2,000 firms and individual collaborators at home and abroad are assisting.

Already 2,700,000 word-cards have been collected. To these will be added the hundred thousands of cards that will result from the working out of the original contributions not yet taken in hand. The contributions were called in during 1904, and most of them have arrived (up to June, 1905: 1,480).

The editor-in-chief will give any information. He should be addressed Dr. Hubert Jansen, Technolexicon, Berlin (NW. 7). Dorotheenstrasse 49. Dr. Jansen deserves and will welcome any assistance from engineers in this praiseworthy enterprise.

Pig Iron Boom in Germany.

It is reported from Berlin that there is no mistaking the boom in pig iron at present throughout Germany, but particularly so in the Silesian district. The demand for pig iron in Upper Silesia is constantly increasing, and is running especially on steel and foundry supplies. It is noticed that speculation secures but little interest, for practically all shipments are going directly to consumers. The output is sold out up to the end of the year, and many orders have been booked for the first quarter of next year. One of the leading producers of the district, who carried heavy stocks for the last two years, has entirely cleared them. Many furnaces who have been on the market as sellers for several years, have withdrawn, as they require the whole production now for their own steel mills, and are even buying iron in fair quantities. The pig iron syndicate has no iron to sell for reasonably early delivery. The pig iron selling syndicate of the Sieg Valley has resolved to reduce the curtailment of the output of pig iron in that district to 25 percent of the producing capacity as from July 1. For several years the curtailment has amounted to 35 percent.

Production of Steel in Japan.

The increasing production of steel in Japan is due to the Imperial Steel Works at Wakamatsu. These works are turning out rails, bars, plates and angles in quantities, and machinery is being ordered for the production of telegraph wire, rivets, bolts, nuts, etc. At present the whole of the production goes to meet Government requirements. It may be safely said that but for the war most of the rails imported during the past year would have been manufactured in Japan at the Imperial Steel Works. It is stated that about 18,000 tons of 60-lb. rails were manufactured there for use in building the military lines in Korea, besides many thousand tons of lighter rails. The United Kingdom's share of the rail import to Japan is reduced to 10 percent, and as anticipated in that legation's report for 1903, the largest share in the trade has fallen to America. Imports of wire nails, however, have increased, probably because a native factory has practically ceased working.

Invitations have been issued for the launching of the Niagara Transit Co.'s new steamer "William A. Rogers" at the Lorain Yards of the American Ship Building Co., July 8. The new boat is named in honor of William A. Rogers, president of the Buffalo & Susquehanna Iron Co.

WELLMAN-SEAVER-MORGAN CO. APPOINTMENTS.

W. A. Stadelman, Eastern agent of the Wellman-Seaver-Morgan Co., Cleveland, who has been in charge of the Eastern office at 42 Broadway, New York, has been appointed general sales agent of the same company, with headquarters at Cleveland, taking effect July 1.

Fred Stadelman has been appointed assistant manager of the New York office of the Wellman-Seaver-Morgan Co.

Harry V. Croll, M. E., for the past eight years with the E. P. Allis Co., and their successors, Allis-Chalmers Co., of Chicago, has resigned and accepted a position with the Wellman-Seaver-Morgan Co.

The Baldwin Locomotive Works, Philadelphia, although it received the order only a month ago for 150 locomotives for the Imperial Government Railways at Japan, has already begun shipments, and the engines will be sent one every day until the contract is filled. These locomotives weigh 102,000 lb. each, are 3½ ft. gauge and the entire contract calls for $1,500,000. A separate order of 100 locomotives was placed for the same parties in February.

The Chicago Pneumatic Tool Co., announces that the company has purchased the Canadian Pneumatic Co., of Montreal, and has secured that company's entire capital stock and will take possession within the next 30 days. This purchase gives the Chicago Pneumatic Tool Co. a Canadian plant which will enable it to transact business in Canada at a large saving of cost in the way of tariff duties, etc. The books for quarterly dividends on stock closed July 10, and the dividends are payable July 20.

The Seaboard Electric Co., Norfolk, Va., recently incorporated, announces that it will deal strictly as jobbers in electrical apparatus and supplies, and hopes in the near future to establish the largest supply house south of New York. The parties interested in the company are now connected with similar companies in their respective cities. The officers are: President, Arthur L. Bosley, Baltimore, Md.; vice president, Joe. W. Little, Atlanta, Ga.; secretary and treasurer, Julien Binford Jr., Richmond, Va.

A leaflet sent out by the Gisholt Machine Co., Madison, Wis., illustrates one of their earliest types of turret lathes. It is always interesting to look over old types of machines and note the difference in construction and appearance of those of the present time. The Gisholt Co. designed and put on the market the earlier heavy turret lathes for finishing medium and large sized castings and forgings. The description now put forth, with views of the latest and earliest types of Gisholt machines, shows the solidity of the foundation as well as exhibits the modern tendency in this line of machine tool making.

The Vulcan Iron Works Co., Toledo, sends out some description of its heavy duty steam shovels. This publication is excellently arranged and is a very attractive piece of work. The steam shovels here described are illustrated with a number of informing line drawings and the description is very complete.

John Lucas & Sons, Ltd., has been registered with a capital of £10,000, to acquire the business of an iron and steel merchant, carried on by J. Lucas at the Charncliffe Works, Sheffield, England, as John Lucas & Sons.

The Toledo Massillon Bridge Co., Toledo, has purchased 12 acres of land on Dorr street crossing the Lake Shore railway. It is the intention of the company, during this year, to build and equip a modern bridge plant to be in operation early in 1906.

CENTRAL POWER STATION OF THE PITTSBURG RAILWAYS.

Many novel features have been incorporated in the system of steam connections and fittings of the central power station of the Pittsburg Railways Co., Pittsburg, by the Pittsburgh Valve, Foundry & Construction Co., of Pittsburg, who installed the entire system. The power plant, located on Brunot's Island, in the Ohio river, consists of two buildings, separated by a fire wall, the one containing the engines and the other the boilers. Steam is generated by twenty Babcock & Wilcox boilers of 500-h. p. capacity each and these serve five Providence engines of 2,600-h. p. capacity each, which are direct connected to Westinghouse generators. The engine room has sufficient space for the installation of three additional engines of the same size if required.

All the boilers are connected by a continuous header system, the header being of 18-in. pipe, 440 ft. long. The expansion

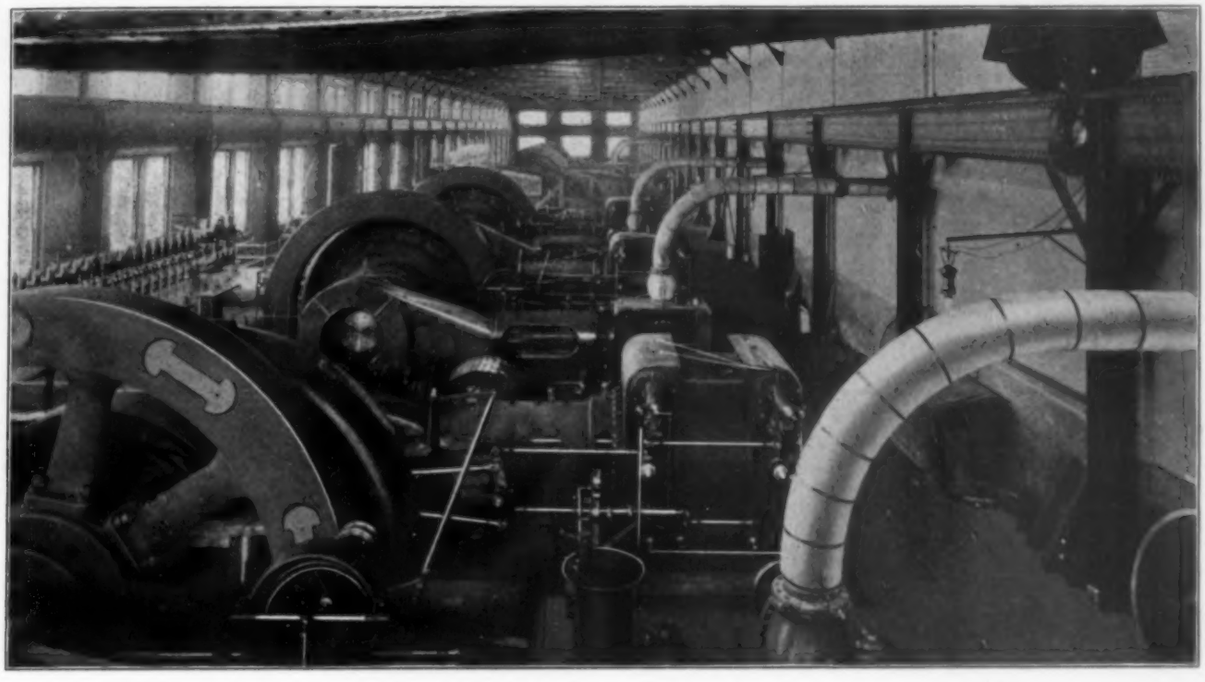


FIG. 1.—ENGINE ROOM OF PITTSBURG RAILWAYS CO.

in the header is provided for by three U loops. It is obvious that in the operation of a street railway power station the entire plant cannot be shut down for repairs to one engine which should suddenly be taken out of service for repairs or on account of accidents, and the steam system is so arranged that a portion of the header can be cut off from the idle equipment and the individual engines operated as if there were no break in the system. Each engine is provided with an individual condenser. These condensers, as well as the feed pumps, are placed in the basement under the engine room and are taken care of by independent steam and exhaust headers.

All the valves in the plant were manufactured by the Pittsburgh Valve Foundry & Construction Co. and all 8 in. and larger are made with taper seats. In all cases wrought iron bends have been used instead of elbows. All the steam work is flanged by the Atwood method. The Atwood joint is worthy of special mention. In making this joint the pipe is turned over hot by special machinery, eliminating all danger of strains beyond the elastic limit. After the joint is finished the pipe is put in a lathe and faced, making both ends absolutely true. The flange swivels on the pipe, thus facilitating erection, as the bolt holes can be turned to any position.

LEGAL DECISIONS OF INTEREST TO LABOR.

The recent decision of Chief Justice Knowlton of the Supreme Court of Massachusetts given in the case of Berry vs. Donovan is of extreme importance in relation to the "closed shop" agreement sometimes signed by a firm and its union employees. In 1902 H. B. Goodrich & Co., of Haverhill, signed an agreement with the Boot & Shoe Workers Union to employ only union men, and not to keep in their shop any man who was objectionable to the union because of arrears in dues, disobedience to union rules, or any other reason.

The delegate Donovan caused Berry's discharge soon after this agreement was signed, claiming that his action was justifiable under the terms of the contract. The court holds that he was not justified on this ground and reaffirms judgment of the lower court for $1,500 damages. Interference by labor unions in cases of this kind is held by the court as not legally justifiable as a kind of competiton between union employes on the one hand and non-union employes on the other, or between employers and employes in an attempt by each class to secure as large a share as possible from their efforts in the industrial field.

The opinion written by Chief Justice Knowlton says: "The gain which a labor union may expect to derive from inducing others to join it is not an improvement to be obtained directly in the conditions under which the men are working, but only added strength for such contests with employers as may arise in the future. An object of this kind is too remote to be considered a benefit in business, such as would justify the infliction of intentional injury upon a third person for the purpose of obtaining it. If such an object were treated as legitimate and allowed to be pursued to its complete accomplishment every employe would be forced into membership in a union, and the unions, by a combination of those in different trades and occupations, would have complete and absolute control of all the industries of the country.

"Employers would be forced to yield to all their demands or give up business. The attainment of such an object in the struggle with employers would not be competition, but monopoly. A monopoly controlling anything which the world

must have is fatal to prosperity and progress. In matters of this kind the law does not tolerate monopolies.

"The attempt to force all laborers to combine in unions is against the policy of the law, because it aims at monopoly. It therefore does not justify causing the discharge by his employer of an individual laborer working under a contract. It is easy to see that for different reasons an act which can be done in legitimate competition by one or two or three persons, each proceeding independently, might take an entirely different character both in its nature and its purpose if done by hundreds in combination.

"We have no desire to put obstacles in the way of employes who are seeking by combination to obtain better conditions for themselves and their families. We have no doubt that laboring men have derived and may hereafter derive advantages from organization. We only say that under correct rules of law and with a proper regard for the rights of individuals labor unions cannot be permitted to drive men out of employment because they choose to work independently.

"If disagreements between those who furnish the capital and those who perform the labor employed in industrial enterprises are to be settled only by industrial wars it would give a great advantage to combinations of employees if they could be permitted by force to obtain a monopoly of the labor market. But we are hopeful that this kind of warfare will soon give way to industrial peace and that rational methods of settling such controversies will be adopted universally."

The Warner & Swasey Co., of Cleveland, is calling attention, at the beginning of the recreation season, to its prism binocular. By the use of the Porro prism, which is remarkable for its clearness of definition and at the same time is arranged to give a rectified field, a binocular has been provided for tourists that in its adaptability to all scenery will add greatly to the pleasure of any outing. The value of the instrument is attested by the extent to which it is being used by the U. S. Army and Navy.

The National Steel Casting Co., Montpelier, Ind., states that it is not its intention to move from Montpelier to Ft. Wayne as has been announced.

NATIONAL SUPPLY AND MACHINERY DEALERS' ASSOCIATION.

The National Supply and Machinery Dealers' Association, through its secretary, J. H. Drury, whose headquarters are at 69-71 Frankfort street, Cleveland, has sent out a neat pamphlet on the aims and purposes of the association, including the following: The necessity of such an organization was brought to the attention of supply dealers of the country entirely through conditions. These conditions are the result of various little abuses which have gradually crept into the methods of doing business and have become very obnoxious to dealers throughout the country. It is unnecessary to attempt to fix the responsibility for these little abuses, but they are here, and are becoming more prominent all the time. Manufacturers at various times have made a slight effort to check them and dealers individually and through local associations have made similar efforts, but without much success, and the only solution seemed to be in the organization of the supply dealers of the country, in such a manner that they could work harmoniously with manufacturers, and together accomplish what neither could alone.

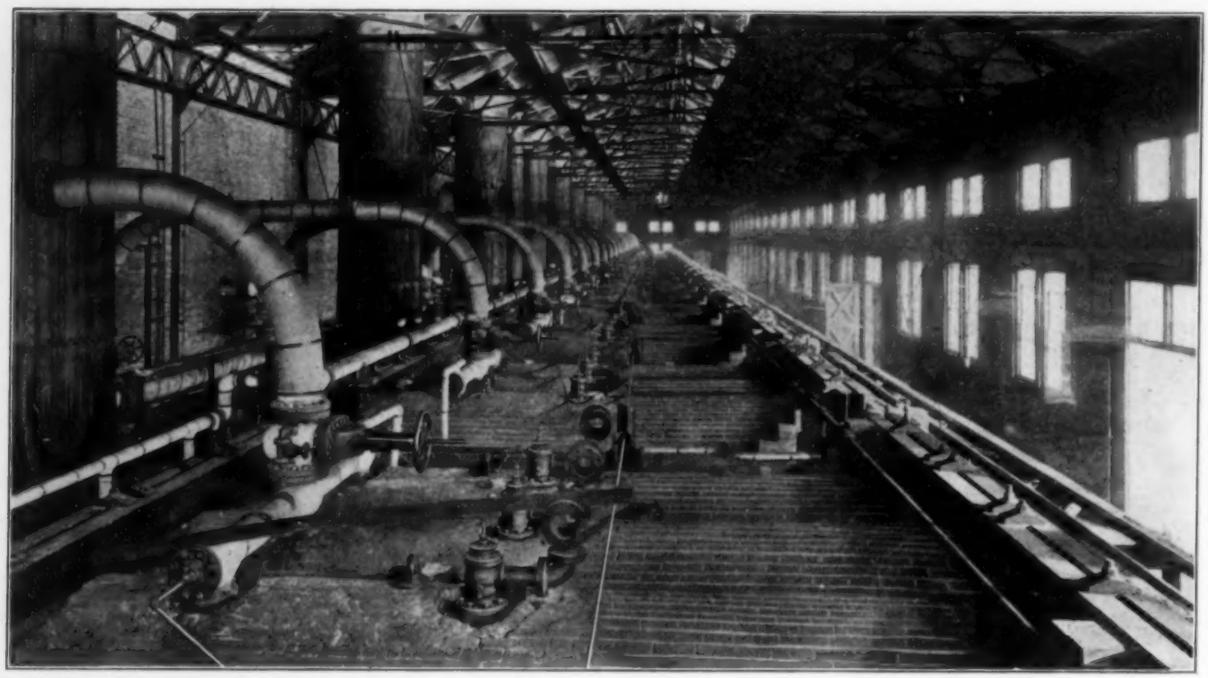


FIG. 2.—BATTERY OF BOILERS SHOWING STEAM CONNECTION AND HEADER.

"Therefore, we may say broadly, that the purpose of this organization is to improve the condition of the dealers, and to work in harmony with the manufacturers. The results we expect will be better profits to both and a much more satisfactory method of conducting business. In marketing goods, the manufacturer usually considers the dealer as being the best medium for distributing his goods, and at the least cost. It is therefore perfectly safe to assume that the manufacturers will be interested in any proposition that the dealers as a body may present, which will work to their mutual interest. A strong, honest combination of dealers throughout the country will be in a position to place the supply business on its proper plane, and an incentive to manufacturers to work in conjunction with the ideas formulated by the Association."

C. H. M'Giehan & Co., mechanical engineers and designers of cost reduction methods, announce their removal to larger quarters at 108 and 110 West Thirty-fourth street, New York.